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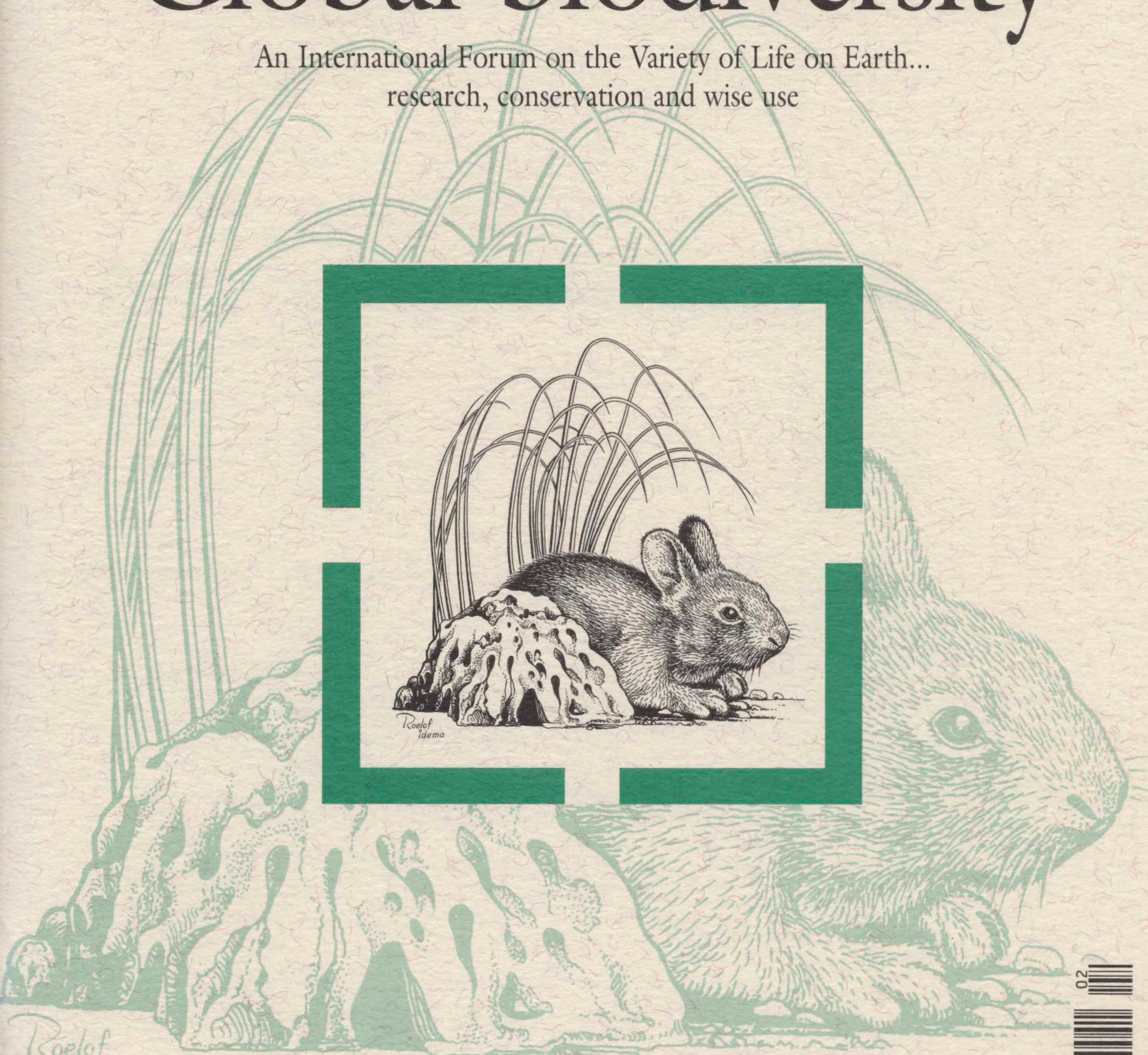

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Editor's Notebook

Who watches over the offshore fishing banks? The need for ocean bottom habitat monitoring.

Any citizen can watch over clear cutting, soil erosion, changes in habitat, and other effects of forest industry practices. But who watches over the floor of our offshore fishing banks? Fishing banks are invisible to the surface observer. How are habitats of offshore fishing banks affected by trawls and other fishing gear? To a large degree we do not know. There is no monitoring of ocean bottoms in a geographically or chronologically regular pattern (with the exception of a few locations such as coral reefs) and little information is available on the frequency of trawling. It is likely that many areas are trawled over again before recovery from the first trawling.

The mouths of modern trawls, held open by trawl doors or otter boards several tonnes in weight, are several dozen metres wide, and made of strong synthetic fibres. The trawls are towed across the bottom by boats powered with engines rated at several thousand horsepower. The intent is to barely touch the bottom with the net itself, but the uneven bottom and wave conditions frequently make the net contact the bottom and the otter boards regularly do so. The result is a marine bushwhacker or bulldozer.

There are several effects of the trawl on bottom habitat. Seaweeds, corals, sea fans, sea anemones, and other protruding invertebrates are broken or sheared off by the trawl. These organisms provide structural habitat, shelter from predators and currents, and food just as forests do on land. The broken off and unattached invertebrates, such as molluscs, sea cucumbers, starfishes, and crustaceans, and non-target fishes are caught by the net, compacted and damaged by the weight of the catch, and emptied on deck, to be later discarded. The discard, called the bycatch, suffers high mortality rates. Trawls also tend to shear off the sediments and stones from the higher points on the bottom and fill in the hollows. This exposes some of the burrowing organisms on the high points to predation while burying those in the hollows. Mud stirred up by passage of the trawl may plug the gills of sea life on either side of the trawl track.

However, one study on the Canadian Atlantic continental shelf suggested that in 1985 there were 4.3 million kilometres of trawler and shellfish dredge tracks. From the above it can be seen that trawling and dredging can have significant impact on the benthic habitat of fishing banks. For conservation of marine biodiversity and management of marine resources we need: 1) to monitor the habitat effects of fishing gear and 2) to establish marine reserves in fishing areas. The fishing reserves will act as controls for the effects of fishing gear and will help conserve biodiversity and protect key spawning, nursery, and migration areas of target species.

Don E. McAllister

Don E. McAllister
Editor

The goals of Global biodiversity are to:

- *Publish articles, views and news on biodiversity*
- *Bridge the gaps between professional disciplines & the public*
- *Communicate vital information to help humankind make decisions on the fate of the Earth's life*
- *Express views on the needs & value of biodiversity research*
- *Provide an international forum for discussing issues on biodiversity*
- *Enhance awareness of the role of biosystematic research & museum collections to conservation & ecologically sustainable use of biodiversity*
- *Discuss methods and philosophy of biodiversity conservation*
- *Review books and major articles on biodiversity*

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It would be helpful if longer manuscripts were submitted in WordPerfect or ASCII format on either 3 1/4" or 5 1/2" inch diskettes, with a hard copy printout to show italics, etc., if in ASCII.

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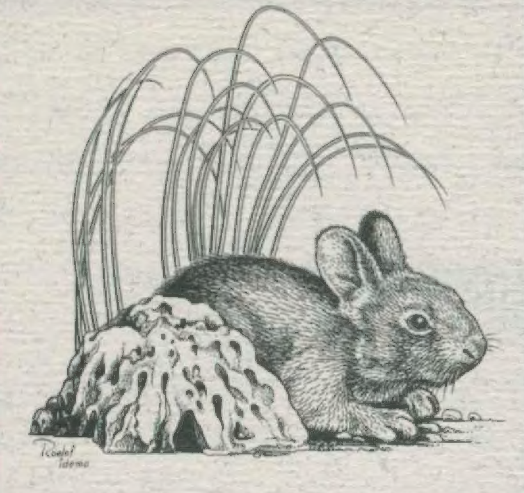

Cover image is the volcano rabbit (*Romerolagus diazi*), representative of Mexican biodiversity

Global biodiversity

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MEXICO'S NATIONAL COMMISSION FOR BIODIVERSITY:

CONABIO

Mexico, a "mega-diversity" country rich in species of animals and plants, was very active in the negotiations for the International Convention on Biological Diversity. Mexico recently took a major step forward in establishing CONABIO, which will focus on providing a firm foundation composed of a knowledge base for conservation of biodiversity and sustainable use of biological resources. Mexico is to be commended for taking this active step forward and providing CONABIO with a sound financial base and a high national priority. [D.E.M.]

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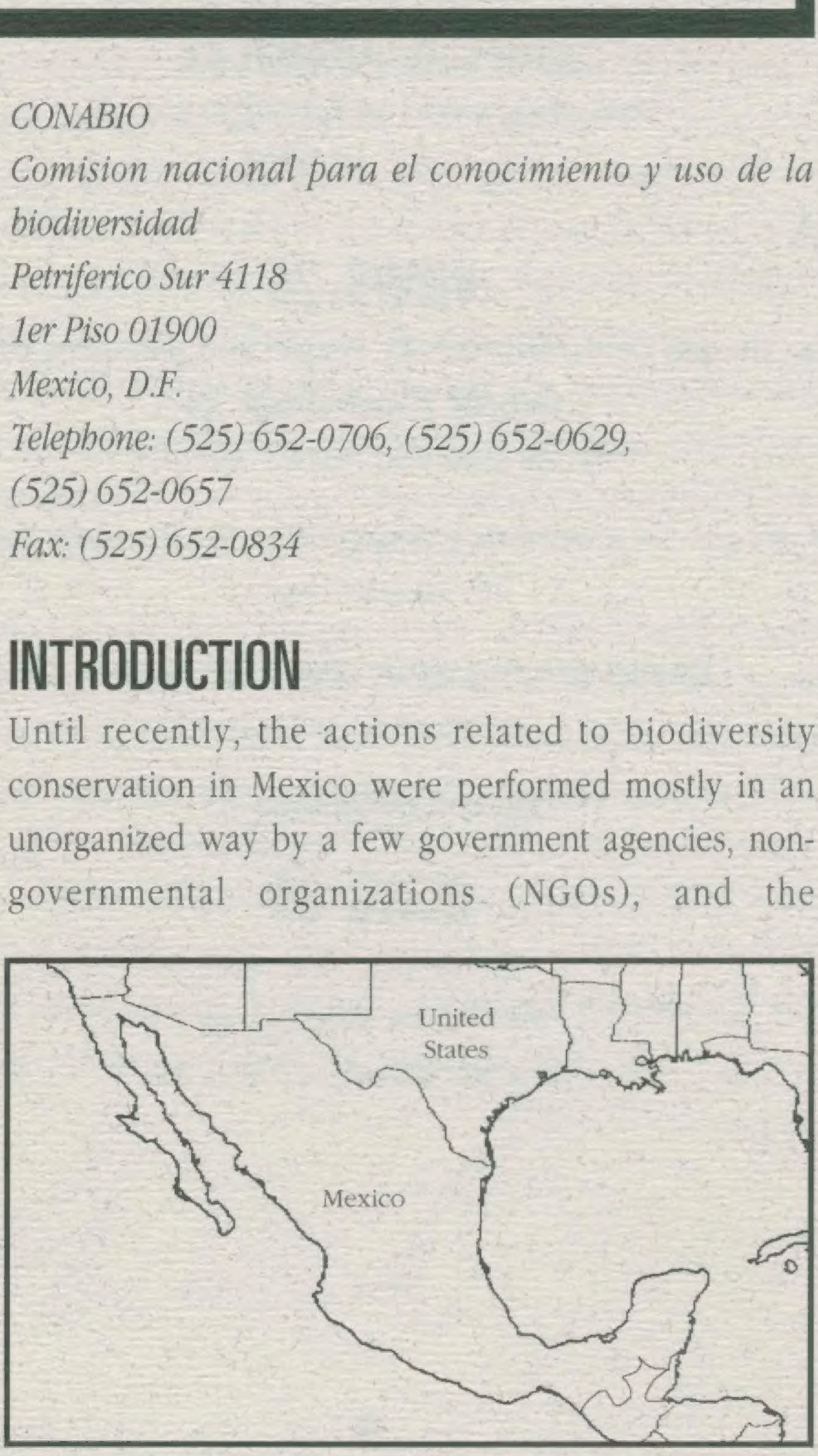
INTRODUCTION

Until recently, the actions related to biodiversity conservation in Mexico were performed mostly in an unorganized way by a few government agencies, non-governmental organizations (NGOs), and the taxonomists, biogeographers, and ecologists who worked in academic circles. Mexico has about 40 biology universities, 30 institutional herbaria, 50 institutional zoological collections, and more than 50 amateur or professional natural history societies. The country also has a few very strong museums, research groups, and associations, which have a national scope, and a majority of local, regional, or incipient efforts. There is a significant body of knowledge and experience related to "peasant" or "indian" sustainable use or folk knowledge that interests some academic groups, a few government agencies, and many NGOs. Despite the existence of two very strong research groups, the biotechnological studies in Mexico are concentrated on only a handful of plant species, mainly cultivated varieties.



On 16 March 1992, President Carlos Salinas de Gortari created the **National Commission for the Knowledge and Use of Biodiversity** (CONABIO). This decision was a consequence of a long process of consultation with academics that lead to an International Meeting on the Knowledge and Conservation of Biodiversity convened by the President himself.

The Commission has a formal structure supported by an operative group. By the presidential decree, CONABIO is headed up by the President of the Commission, (presently, as of June 1994, the President of the Republic, Carlos Salinas de Gortari); a Technical Secretary (presently the Minister of Social Development [SEDESOL], Secretary Luis Donaldo Colosio Murrieta); and the heads of the following Ministries: Foreign Affairs (SRE), Treasury (SHCP), Energy (SEMIP), Commerce (SECOFI), Agriculture (SARH), Education (SEP), Health (SS) and Fisheries (SEPESCA). The operative group is composed of the National Coordinator, José Sarukhán, and a staff of 20 executives and analysts.

The Commission was officially installed on 16 July 1992 and the preliminary budget was released in mid-August.

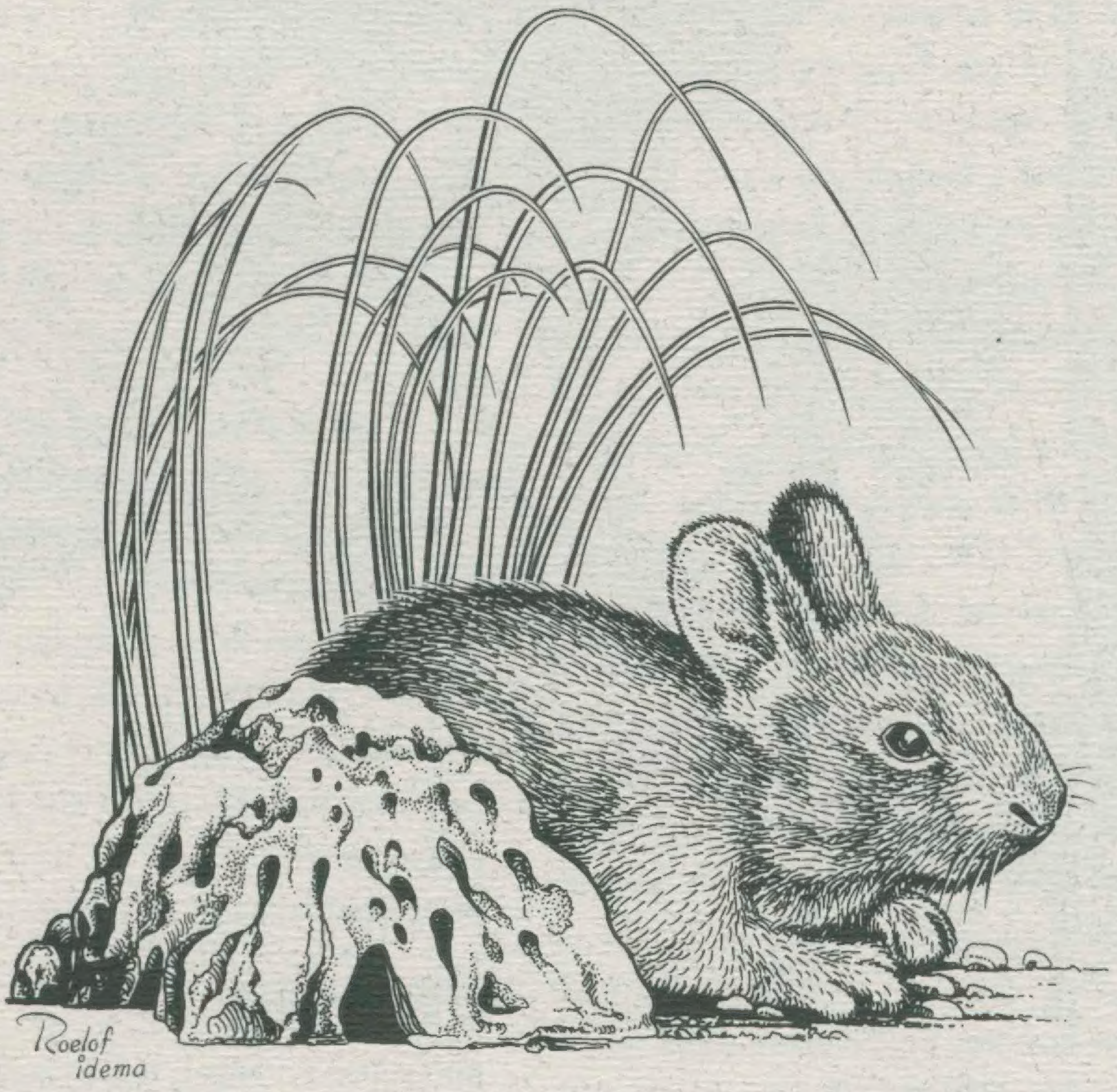
Although its definitive budget is still being considered, significant advances have occurred because the federal government has made a substantial commitment to both operating expenses and project support. Roughly, the current budget is $800,000 per year for operations (salaries, rent, telephone, etc.) and a promised $5,000,000 for projects, of which about $1,500,000 are already in the process of being allocated to a trust fund. This trust fund has been established to increase the projects part of the budget by resorting to private or foreign contributions.

OBJECTIVES OF CONABIO

CONABIO's fundamental task is to promote and coordinate the efforts that are currently being made by numerous institutions and groups in Mexico along three main lines:

1) knowledge—in the form of inventories and data bases,
2) sustainable use, and
3) popularization of knowledge about biodiversity in the society as a whole.

Since the Commission has a role of promotion and coordination, most of its resources will be channelled to support the studies and projects of already existing institutions or groups. Priorities are being defined in consultation with experts or interested organizations. CONABIO has already held meetings with some of the main Mexican and foreign experts on the subjects within its scope.



The volcano rabbit, *Romerolagus diazi*, is an endemic species with a highly restricted range. It occurs on three discontinuous areas (between 300 and 4,250 m) on the slopes of four volcanoes only 50 km from Mexico City. It is known as the zacatuche or teporingo. *Romerolagus diazi* is considered to be the most primitive and one of the smallest lagomorphs, with body lengths up to 310 mm. It has short, rounded ears, short hind legs and feet, and virtually no tail. The upper pelage is grayish brown and black; the lower pelage, gray. Their main habitat is pine forest with a dense ground cover of zacaton grass (a mix of approximately four grasses and ten herbs). The rabbit burrows in, nests in, and eats the zacaton. Groups of up to six animals form loose hierarchies. The gestation period is 40 days and the mean litter size is 2.1. Habitat destruction, the prime threat to the volcano rabbit, occurs through forest fires, grazing by cows and sheep, and encroachment by agriculture and property development. Hunting, which is now illegal, also is a threat; most hunters do not distinguish between the volcano rabbit and two sympatric *Sylvilagus* species.

Monarch butterflies migrate south from the United States and Canada and overwinter in a mountain-top forest west of Mexico City. Agriculture and forestry practices are reducing habitat and population numbers. "Monarca: Butterfly without Boundaries," an exhibit mounted by the Canadian Museum of Nature, the Canadian Nature Federation, and Monarca A.C., a Mexican conservation group, is now travelling to Mexico via California and is increasing awareness of the Monarch's plight.

Objective 1: Knowledge

On the subject of inventories and databases, CONABIO has received more than 150 applications for financial support. Those that lie within the priorities of the Commission are refereed externally. Four priority projects have already been evaluated and are currently being supported: an *Atlas of Mexican Birds*, and *Atlas of Mexican Mammals* (both projects include providing the Commission with the raw biogeographic data on magnetic media and represent the repatriation of the information on almost a million specimens that are distributed in many American and European museums), a study of the park of Omiltemi, and a field study on legal and illegal traffic in Mexican vertebrates. The first results of these projects include information on some 20,000 vertebrate specimens. Another 30 projects were approved by the referees, and in the immediate future, as soon as the budget is released, CONABIO will be funding the electronic capture or release of information on many of the most important collections, museums, or herbaria in Mexico. CONABIO will obtain information based on the model of "data custodianship," developed by the Australian Environmental Resources Information Network (ERIN). In this model an institution that is currently working on a taxonomic group or groups agrees to update and increase the data base, and formally becomes the custodian or the authority on the information relative to the group in question. CONABIO therefore acts mainly as the concentrator and distributor of the information released by the custodians.

Objective 2: Sustainable use

On the subject of sustainable use, CONABIO has held talks with the main academic groups related to phytochemistry, pharmacology, and ethnobotany as well as with the heads of the Mexican pharmaceutical industry and representatives of a multinational company. Mexico has a substantial infrastructure related to pharmaceutical issues, and therefore, CONABIO will support only those pharmaceutical projects with a significant Mexican participation.

Objective 3: Public awareness

The third objective of CONABIO is to increase Mexican public awareness about the importance of biodiversity. In support of this aim, CONABIO is supporting an ambitious project of 26 television programs on Mexican natural landscapes, their use, the threats against them, and alternatives. CONABIO is also developing two other projects: one on human resources training, the second on publications.

CONABIO AND OTHER SIMILAR AGENCIES

It is interesting to describe briefly the differences and similarities between CONABIO and two other related agencies: INBio in Costa Rica and ERIN in Australia. Like ERIN, CONABIO is a government agency in charge of dealing with information on biodiversity by resorting to national networks and custodians. INBio has this same role, but it is a NGO and its network will rely strongly on foreign institutions. Although Mexico will also rely heavily on foreign information, it recognizes that there are many Mexican institutions capable of acting as custodians.

The three agencies have a lot in common regarding the policies on information quality, distribution, and ownership, but INBio, unlike ERIN and CONABIO, is doing its own collecting and curating of specimens. Both CONABIO and INBio share the same computer system and GIS, and they are developing their data models in close contact. As agencies of Latin American developing countries, both CONABIO and INBio stress a model of conserving-by-using, an area in which INBio has pioneered and which CONABIO is following very closely.

CONCLUSION

Although it is unlikely that a single "model" will work for all countries willing to create national biodiversity agencies, it is remarkable that countries as different as Australia, Costa Rica, and Mexico are converging in several fundamental concepts and methods. No doubt the social, biogeographical, and economic particularities of different countries will require different approaches, but surely this is only fitting for a subject like biodiversity.

Crested Caracara

Caracara plancus

The Crested Caracara, *Caracara plancus*, is a member of the family Falconidae. It is one of the largest members of the family, with broad eaglelike wings. The Caracara is mainly a scavenger, although much more predatory than vultures, and eats a varied diet: fish, turtle eggs, dung beetles, beetle larvae, frogs, and even sheep and goat carcasses. Kleptoparasitism, or the habit of chasing and harassing other birds to make them disgorge their food, is occasionally practised. During the mating season, males fight in the air, but do not otherwise display. Two or three eggs are laid, incubated by both adults, and hatch in four weeks. The Caracara is known as the Mexican eagle and is widely accepted as Mexico's national symbol, which in turn was derived from Aztec carvings of an eaglelike bird with a snake in its talons. In fact, ethnozoological work has established that the national symbol is more likely to be the Golden Eagle (*Aquila chrysaetos*) or the Red-tailed Hawk (*Buteo jamaicensis*), on the basis of diet and geographic range.

A STRATEGY FOR IMPLEMENTING THE CONVENTION ON BIOLOGICAL DIVERSITY:

The Quebec approach

Under the Canadian federation, the provinces have major responsibilities relating to biodiversity conservation and to biological resource management. Quebec, Canada's largest province, has been in the forefront in developing nature reserves and in recently developing forward-looking forestry and biodiversity policies. This article, translated from the French, and first presented on 17 May 1994 to the French Canadian Association for the Advancement of Science (L'ACFAS) in Montreal, Quebec, will help those seeking to develop their own policies. [D.E.M.]

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INTRODUCTION

Biological diversity is the modern way to interpret the complexity of life. We must also become aware that our development and existence would be impossible without this diversity. Even though biological diversity, or biodiversity, has been present on Earth for more than 3.5 billion years; even though people's most basic needs directly depend on it; even though we live among it in various forms every day, it is astonishing that in June of 1992 the various peoples on Earth deemed it urgent to adopt a convention about it. On the heels of international consciousness-raising about the degradation of our environment, it has become clear that an even greater catastrophe than global warming, the intoxication of the ecosystems, or the population explosion awaits us if vigorous measures are not forthcoming to safeguard life on Earth.

Simple in appearance, but extremely complex, the notion of biodiversity simultaneously encompasses the genetic variability present all over the living world (i.e., genetic diversity), taxonomic entities (i.e., species diversity) and the entire range of natural environments as well as the multitude of biological phenomena that occur in them (i.e., ecological diversity). Finally, there is the never-ceasing artificial creation of nature (i.e., biodiversity of anthropic origin). The latter diversity concerns, in particular, all kinds of genetic manipulation, the creation of new races, new varieties, and so on.

Implementing the International Convention on Biological Diversity is tantamount to taking up one of the major challenges of the turn of the century. First of all, it is a regional challenge. We in Quebec must conserve, sustainably use, and equally share our *total wealth* as scientists often refer to it. As well, each of us must take some responsibility for the biodiversity challenge at the global level.

In order to meet this challenge, the Quebec government decided on 25 November 1992, through an order-in-council of the cabinet, to support the principles of the Convention on Biological Diversity. At the same time, Quebec informed the Canadian government, a signatory of the Convention, of its decision and formally accepted its ratification by the federal government. To make its commitment more concrete, the Quebec government set up an interdepartmental committee to propose an implementation strategy and timetable.

Presided over by the Ministère de l'Environnement et de la Faune (department of the environment and wildlife), the interdepartmental committee also includes departments in the following areas: natural resources; agriculture, fisheries, and food; industry, commerce, science, and technology; municipal affairs; international affairs; and the secretariat of Canadian intergovernmental affairs. The work of the Quebec interdepartmental committee on biodiversity began in March 1993. To help, a limited-scope interdepartmental task force was set up, also under the responsibility of the Ministère de l'Environnement et de la Faune.

A TWO-TIERED APPROACH

Devising a Quebec strategy for implementing the Convention on Biological Diversity immediately brought to mind the reality of our current political regime; that is, Quebec is one of ten provinces with its own government and rights under the Canadian federal government. Thus, as we worked at developing a Quebec approach, we actively participated in the Canadian initiative dealing with the same concerns and took its approach into account.

Bearing in mind the very tight timetables the federal representatives had set themselves, and considering the vast and probable implications for Quebec, we opted to spend the required time to monitor, comment on, and in so doing, contribute to the development of a Canadian strategy on biological diversity. Quebec wanted, among other things:

a) to ensure that Quebec's jurisdictions, which are particularly abundant in biodiversity, be respected;

b) to ascertain the impact of a national action plan on Quebec's responsibilities and activities in biodiversity; and

c) to ensure that the broad national orientation and Quebec's eventual action be complementary.

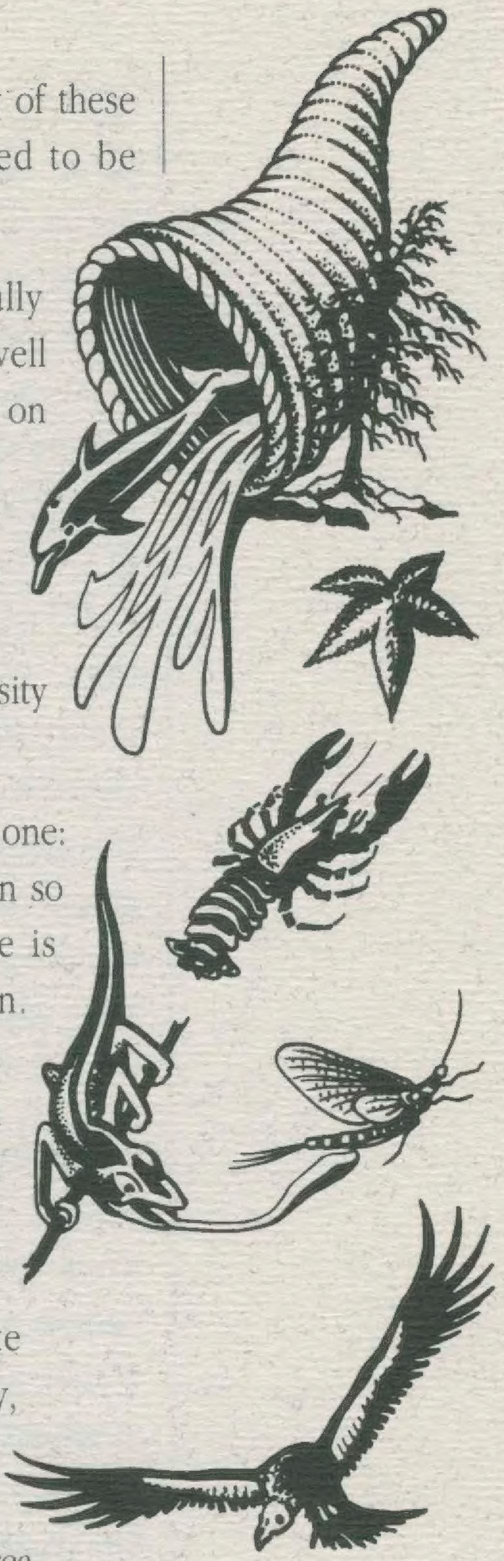
Despite the time that is being spent on the draft version of the Canadian strategy, Quebec would still like to produce a shortened version of the implementation strategy within the timetables similar to those set for the national group. And in addition to the strategy paper, Quebec wants to draft an action plan of a probable scope of 5 to 10 years.

POSITIVE PAST ACHIEVEMENTS

At the outset, we have to recognize that Quebec is relatively at ease with the scope of the statements advanced in the Convention on Biological Diversity. Accordingly, in a document entitled *"Bilan des lois, règlements, politiques, programmes et activités au Québec reliés aux dispositions de la Convention sur la diversité biologique,"* August 1993, 34 pages, (French version only), the interdepartmental task force stressed that Quebec already had many tools that were entirely consistent with the spirit and the letter of the international convention. At first glance, this can seem both surprising and reassuring. However, many of these biodiversity tools are quite recent and need to be perfected.

Furthermore, this appraisal must be continually updated. Among other things, it should go well beyond the government information currently on record. It should record the actions of research and teaching institutions, those of para-governmental agencies, industries, non-profit and non-governmental organizations as well as the action of individuals involved in biodiversity concerns.

A difficult task lays ahead, albeit an essential one: we must be critical of the appraisal information so we are not deluded into thinking that there is nothing to change in the current situation. Indeed, one could be tempted to believe that there would be very few changes to make in the Quebec efforts to conserve biodiversity, given our numerous interventions in the field. But, in order to ensure that the required elements are introduced or the appropriate corrections are made on behalf of biodiversity, there must be a detailed analysis of the various governmental programs that have impacts on it. This is particularly pertinent for the entire area of the use of wildlife, farming, and forest resources.



The Quebec approach will strive to preserve all living forms, including their genes and the living mosaics in which they are intertwined.

In any event, this initial appraisal has indicated to us that we must look not so much to the courts and regulatory bodies to solve priority problems as to a variety of bodies. To protect living species and ecosystems, Quebec must have an integrated approach in all governmental and non-governmental actions.

APPRAISAL OF BIODIVERSITY

We can also think that all is well as long as we do not know the actual state, requirements, and problems of biodiversity. In Quebec, even though certain sectorial reports have been published over the past few years, no satisfactory global assessment of biodiversity exists. In 1992, a report appeared on Quebec vertebrate wildlife. In 1993, an official list of the species of fauna and flora likely to be designated endangered or threatened was published in the *Gazette officielle*. Lately, an abridged report on the biodiversity of the Saint Lawrence was also produced. As well, a regional assessment of Quebec wetlands, based on vegetation, was performed in recent years.

However, we are far from knowing all the species of plants and wildlife in the province, whether it be with regard to their name, distribution range, specific role in the ecosystems, or the dangers facing them. Neither do there exist catalogues of Quebec ecosystems; many await classification, typology, and eventually, mapping. As to the knowledge of genetic diversity present in Quebec, a handful of specialists hold very partial information on the topic. A catalogue of chromosome numbers of Quebec wild plants is currently in the making, and only a few specific monographs have been produced. Quebec innovations in the creation of races, varieties, cultivars, etc., remain to be catalogued and compiled.

As Quebec devises an implementation strategy, we cannot afford to wait for the publication of future appraisals before proposing orientations and an action plan. Society must accept that development has to take into account the extent of our knowledge on biodiversity. If we wait to have all the desirable knowledge at our disposal, few conservation interventions will be possible.

In devising our implementation strategy, the present body of biodiversity knowledge should be granted an appropriate forum. Moreover, we must find out how to use the information that is constantly being updated. It is not so much the inventories that are lacking but a compilation of all the information on biodiversity and its validation in an appropriate ecological format. In that sense, using the *Centre de données sur le patrimoine naturel* (Natural Heritage Data Centre) that is currently housed at the Ministère de l'Environnement et de la Faune is vital. Moreover, to adequately use this information and that in other data banks—of which we are often unaware—it is essential to promote the interconnection among large data bases on our biological diversity.

Of course, a Quebec strategy should consider the maintenance of herbariums and other public or private scientific collections. These represent a priceless recollection whose reconstitution would require considerable expense and delays—detrimental to the conservation and sustainable use of our biodiversity.

OTHER APPRAISALS

In order to adequately define the limits of the biodiversity issues, our current approach is also based on a knowledge of certain other likely important factors. Accordingly, the questions of population trends, the evolution of climatic change, the economic value of biodiversity as resources, products, and services will be analyzed specifically. The economic analysis will also delve into the incentives that could promote biodiversity, such as those specifically provided for in the Convention. This approach will also test and perfect an assessment approach of interventions by government or other sources that have a strong impact on biodiversity. Finally, to be acceptable and credible, the economic benefits and costs for Quebec will also be assessed.

Furthermore, we are trying to clearly identify the sharing of responsibilities in Quebec. We must determine who is responsible for what with regard to biodiversity. Who will intervene for biodiversity in order to harmonize actions and avoid duplication? Without this harmonization, additional costs and administrative constraints will penalize species and environments.

MAJOR ORIENTATIONS FOR THE IMPLEMENTATION STRATEGY

For natural resources conserved *in situ*, for wildlife, forest, farm, and pharmaceutical resources, and for biological resources in the city and the North, Quebec's strategy for implementing the Convention will include an assessment and analysis of the current extent of preserved diversity or that used by humans. Thereafter, we will also look at the gap between what is being done now and what would be required by the adequate implementation of the principles contained in articles of the Convention on Biological Diversity.

This brings us to propose recommendations of concrete actions and measures aimed at rectifying inadequate situations. Generally speaking, the Quebec strategy will seek to promote the following issues:

- the implementation of approaches that focus on ecosystems and manage resources in an integrated way;
- the establishment of time-specific objectives for conservation, sustainable use, and restoration to allow us to understand the extent, progression, and scope of actions to be undertaken; and
- the communication of information to the public and resource land managers, thereby enhancing their sense of responsibility about sustaining and safeguarding biodiversity.

More specifically, in the major sectors of conservation and the sustainable use of resources, the following is a highlight of certain orientations that are currently being examined.

Conservation *in situ*

In terms of conservation *in situ*, the Québec strategy will address:

a) an analysis of what several networks of protected areas are contributing to the maintenance of biodiversity; after a century of interventions in the field, the extent of our knowledge is largely fragmentary.

b) the protection of past achievements currently offered by the network of parks and ecological reserves.

c) an integration of current conservation sectorial policies aimed at choosing, establishing, and managing all the protected areas in Quebec. Prior to that, however, we must adopt an ecological framework of spatial reference to prioritize, among other things, the conservation of wetlands, unique sites, threatened or potentially threatened habitats, and environments that are representative of Quebec's biodiversity.

d) increased partnership with environmental organizations and the private sector by developing various incentive programs.

e) a considerable rise in the number of protected sites by taking into account the international classification developed by the World Conservation Union (IUCN).

f) along with municipalities and regional municipal counties, the developmentof land use planning that takes into consideration the land designation around the protected sites; in this way we can guarantee the best possible conditions for maintaining biological diversity, especially near small protected sites.

Conservation *ex situ*

For conservation *ex situ*, the implementation strategy will have to evaluate how we can:

a) ensure the optimum conditions to enable herbariums, aquariums, zoological gardens, etc. to contribute significantly to the conservation *ex situ* of biological diversity.

b) identify all existing Quebec banks (housing genes, seeds, plants, rare microorganisms, etc.) and assess their status and methods of protection and management; perform an inventory on the varieties and races of plants and domestic animals that exist in Quebec and in the educational institutions linked to the development of races and varieties.

The sustainable use of biological resources

In spite of the considerable and additional efforts that we could invest in conservation *in situ* and *ex situ*, these cannot alone significantly safeguard all the biological diversity of Quebec. Strategic actions must be widely undertaken and in an urgent manner within the framework of the daily use of resources. This goes for the very maintenance of activities that depend on the biological resources exploited or used and biodiversity *per se*.

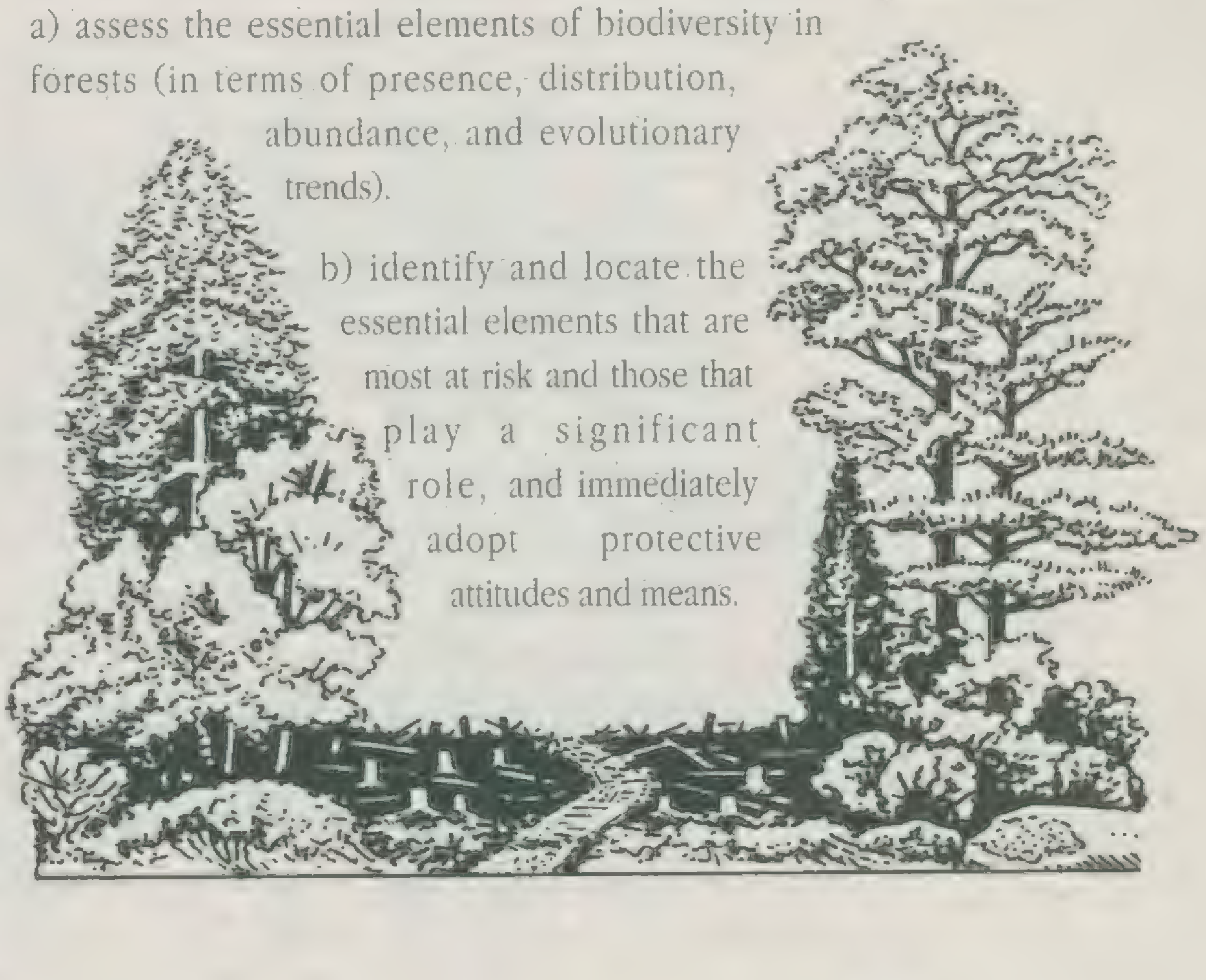
It is vital that we do not compromise the capacity to renew valuable biological resources.

In forests

It will be necessary to:

a) assess the essential elements of biodiversity in forests (in terms of presence, distribution, abundance, and evolutionary trends).

b) identify and locate the essential elements that are most at risk and those that play a significant role, and immediately adopt protective attitudes and means.



c) examine the effects that the current forest harvesting activities have on the sustainable use of the essential elements of biodiversity and swiftly apply the corrective measures.

d) propose a management program in forests based on an assessment framework and on the indicators used in the follow-up of the impacts of forest activities on biological resources.

e) understand the mechanisms of natural changes that govern the maintenance and dynamics of environments and seek to obtain similar effects through a sustainable use of the resources.

f) improve the intervention strategies of forest management activities that better use biological resources and apply them in a broader fashion.

On farms

On farms, the artificial creation of biodiversity and its exploitation for a host of purposes is the most intense. Accordingly, the Quebec strategy should aim to:

a) improve the current protection strategy of farm watercourses so that it targets the protection of fauna and flora more specifically.

b) promote a policy of sustainable development for the bio-food sector that integrates the essential elements of biological diversity. Among other things, it should provide for the restoration of degraded ecosystems—mainly, the aquatic ecosystems affected by farming activities. It should eliminate or alleviate the harmful impacts of those activities and take into consideration the impacts of current farming programs and policies.

c) further enhance the new possibilities offered by the practices of organic agriculture, the soil's microorganisms, insect biology, companion planting that increases natural resistance to parasites, integrated control, farm fertilizers, composting, the greater welfare of animals, recycling, and produce/product enhancement.

d) assess the biodiversity of natural populations of species that are important in farming and safeguard them in protected zones.

Sustainable use of wildlife resources

The use of resources for hunting, fishing, or trapping and the tourist use of wildlife resources are major issues in the sustainable use of biological resources. To that end, the Quebec strategy for implementing the Convention should strive to:

a) assess the external factors that have the most impact on wildlife species and then limit that impact.

b) promote integrated and long-term programs to monitor biological resources *in situ* in order to define and rectify the observed negative trends.

c) reduce the negative human impact on ecosystems, particularly on aquatic ecosystems, and restore the degraded ecosystems as much as possible.

d) protect fragile habitats, unique ecosystems, zones in which there is a high proportion of biodiversity, and environments where endangered species and endemic species live.

e) speed up the recognition of crucial wildlife habitats and protect them in order to maintain viable animal populations.

f) manage terrestrial and aquatic ecosystems in order to maintain and restore their function, stability, and composition.

g) make sure that animal harvesting maintains the existing potential and that there are no substantial harmful effects on other elements of biodiversity.

h) develop management strategies to conserve wildlife resources other than game and fish.

Cooperation – concerted action – commitment

One of the important parts of the Convention on Biological Diversity deals with the cooperation, concerted action, and commitment of all. Quebec is highly dependent on biodiversity. Its forest, farming, recreational, and tourist economy is directly related to biodiversity, especially in regions outside the urban centres.

The issue of conservation and sustainable use represents a major (and interesting) item of concern to maintain the vitality of suburbs and rural centres. The current disorganization of the Quebec rural areas is partially due to the poor use of biodiversity and to the unimaginative harvesting and sustaining of biological resources.

The implementation strategy should make it easier to appropriate the conservation of resources and their sustainable use through regional environments and local communities. The carrying out of regional and local implementation plans could even be the occasion to re-establish certain economies focused on biodiversity.

At the national level, the Quebec strategy should strive, as much as possible, to work with the Canadian strategy in order to harmonize actions, especially actions of shared jurisdiction.

Accordingly, the Quebec implementation strategy should make sure that:

a) the Canadian negotiators will take Quebec's positions into consideration with regard to the international agreements on the sharing of benefits arising from the use of biological resources;

b) the federal representatives will consider Quebec's positions on any change to legislation and international agreements concerning transportation, handling, and the use of genetically transformed organisms;

c) Quebec experts, in the various sectors of biodiversity, will be supported when their expertise is required on a global scale.

CONCLUSION

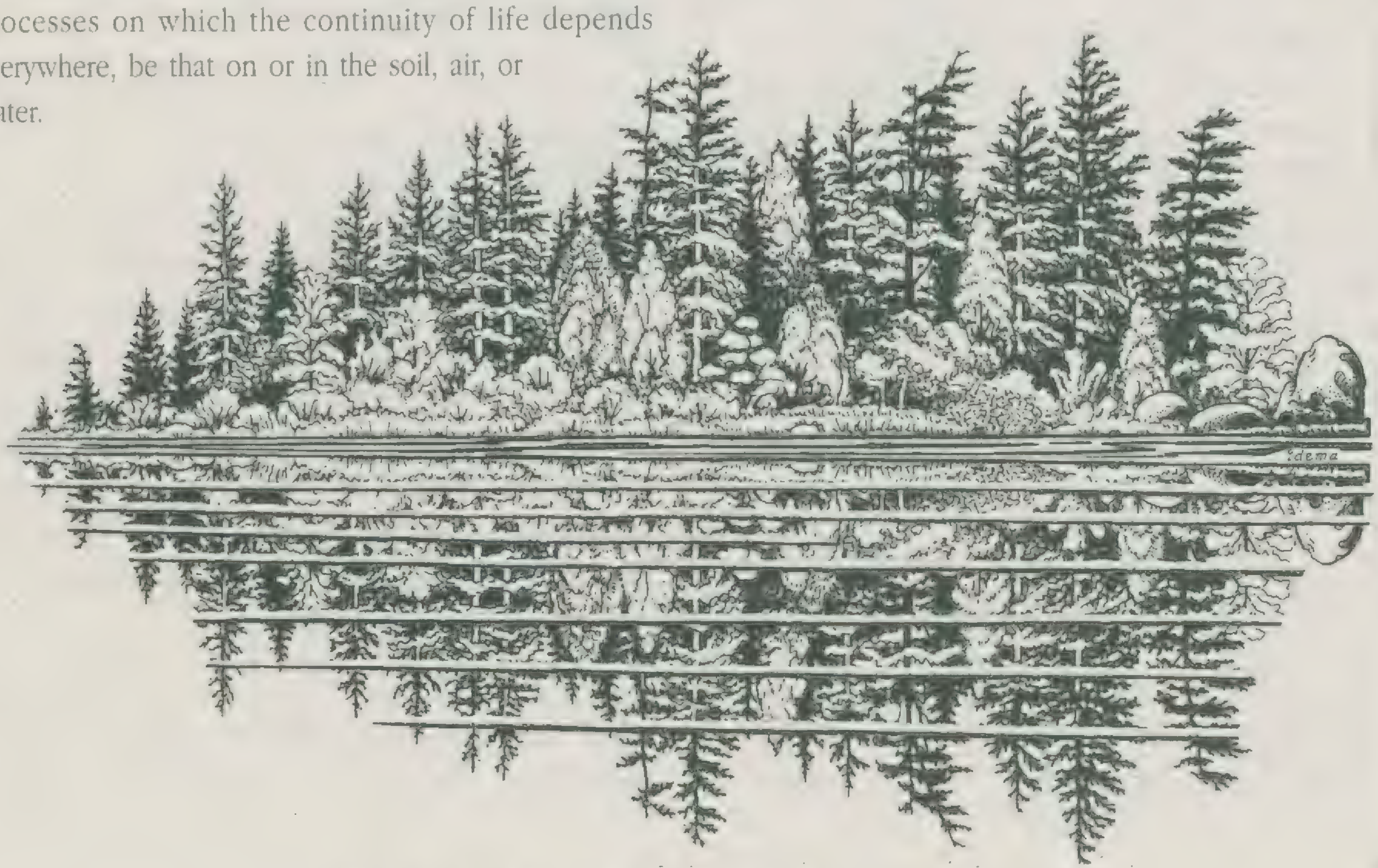
To safeguard biodiversity, we have no choice but to focus our development on the preservation of the Earth's life. Therefore, development should integrate energetic measures designed to effectively protect the diversity, functioning, and organization of our ecosystems. To do so, Quebec should take into account three major requirements:

1) **Preserve the ecosystems and ecological processes.** To that end, we must avoid endangering the natural processes on which the continuity of life depends everywhere, be that on or in the soil, air, or water.

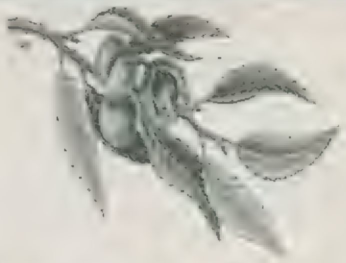
2) **Conserve the diversity of living forms.** We must ensure the maintenance and perpetuity of the greatest possible number of living forms. We are referring here not only to all plants, animals, and other forms of life, but also, to their gene pool, the diversity of the environments in which they live, and the complexity of the living mosaics into which such creatures are integrated.

3) **Ensure that we do not compromise the capacity to renew biological resources.** Biological resources should be used with moderation, without irreparably destroying the natural environments, and with respect to the ecological thresholds of the environments. We must avoid the premature extinction of living species so closely linked to the various ecosystems, and which, in return, ensure the proper functioning of the biosphere to keep us alive.

These major challenges can be accomplished by asking the right questions without delay, mobilizing society around common concerns, informing, and seeking solutions together for our collective survival. In short, this is the direction that the Quebec strategy for implementing the Convention on Biological Diversity is taking.



The Quebec approach to conserving biodiversity will aim to preserve ecosystems and the natural processes on which we depend.



THE AMERICAN CHESTNUT *(Castanea dentata)*

A tree almost decimated in a few decades*

FAST FACTS

COSEWIC status: designated as threatened in 1987
Ecozone: deciduous forest region
Other name: sweet chestnut
French name: châtaignier d'Amérique
Scientific name: *Castanea dentata* (Marsh.) Borkh.
Synonym: *Castanea americana* Raf.

Division: Magnoliophyta - Flowering plants
Class: Magnoliopsida - Dicotyledons
Family: Fagaceae - Beech
Genus: *Castanea* (Gr) - Chestnut
Species: *dentata* (L) - Dentate or Toothed

Distinctive features
Size - The American chestnut seldom reaches a height of 10 m and a diameter of 15 cm.
Leaves - 15-21 cm long, 5-7 cm wide; lateral veins parallel, prominent, extending beyond the teeth to form short bristles.
Fruit - nut (chestnut) is dull brown, smooth, in groups of 1-3 in a spiny burr; kernel is edible and sweet-tasting.

Jean Lauriault
Public Programming
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At the turn of the century, the American chestnut was commonly found in the deciduous forest region of eastern North America, where it easily reached a height of 18 to 25 m and a diameter of 50 to 100 cm. Today, it seldom reaches a height of 10 m and a diameter of 15 cm. Who would have thought at that time that a tree could be almost wiped out so rapidly? This is exactly what has happened. In less than a generation, whole stands have fallen victim to the chestnut blight, which causes canker of the bark and withering. This is a classic example in plant pathology of an epidemic caused by an introduced exotic organism, the Asian pathogenic fungus of the phloem, *Cryphonectria parasitica* (Murr.) Barr. (previously called *Endothia parasitica* (Murr.) Anderson & Anderson), introduced in North America on stocks of Japanese chestnut (*Castanea crenata* Siebold & Zucc.) toward the end of the last century. This species has been imported into the United States since 1876.

Suckers are what remain of most of the chestnuts that formerly formed the oak-chestnut forest region. As the chestnut is no longer considered an important timberspecies, its ecology and its biological cycle are rarely the object of scientific studies. Some living roots remain, however, and these sprout suckers usually live long enough to produce a crop of seed. The species is still found in southwestern Ontario, its former range in Canada. A survey carried out in 1985 found it at forty-nine sites.

It was in 1904, at the New York Zoological Garden, that the ravages of the blight were first noticed. Like the white pine blister rust and the Dutch elm disease, the chestnut blight spread rapidly in forests where the American chestnut grew. But unlike white pine blister rust, which attacks that species via an intermediate host (*Ribes*), chestnut blight spreads from tree to tree by spores carried by the wind, water, insects, and birds. In less than 50 years, the disease had spread over the whole range of the American chestnut. Not only did it destroy indigenous species (*C. dentata* and *C. pumila* [L.] Mill.), it also laid waste to vast plantations of European sweet chestnut (*C. sativa* Mill.) in North America.

It was not until 1938, in Genoa, Italy, that the chestnut blight was reported on *C. sativa*. Even though the disease spread more slowly in Europe, it nevertheless caused

* translated from the French

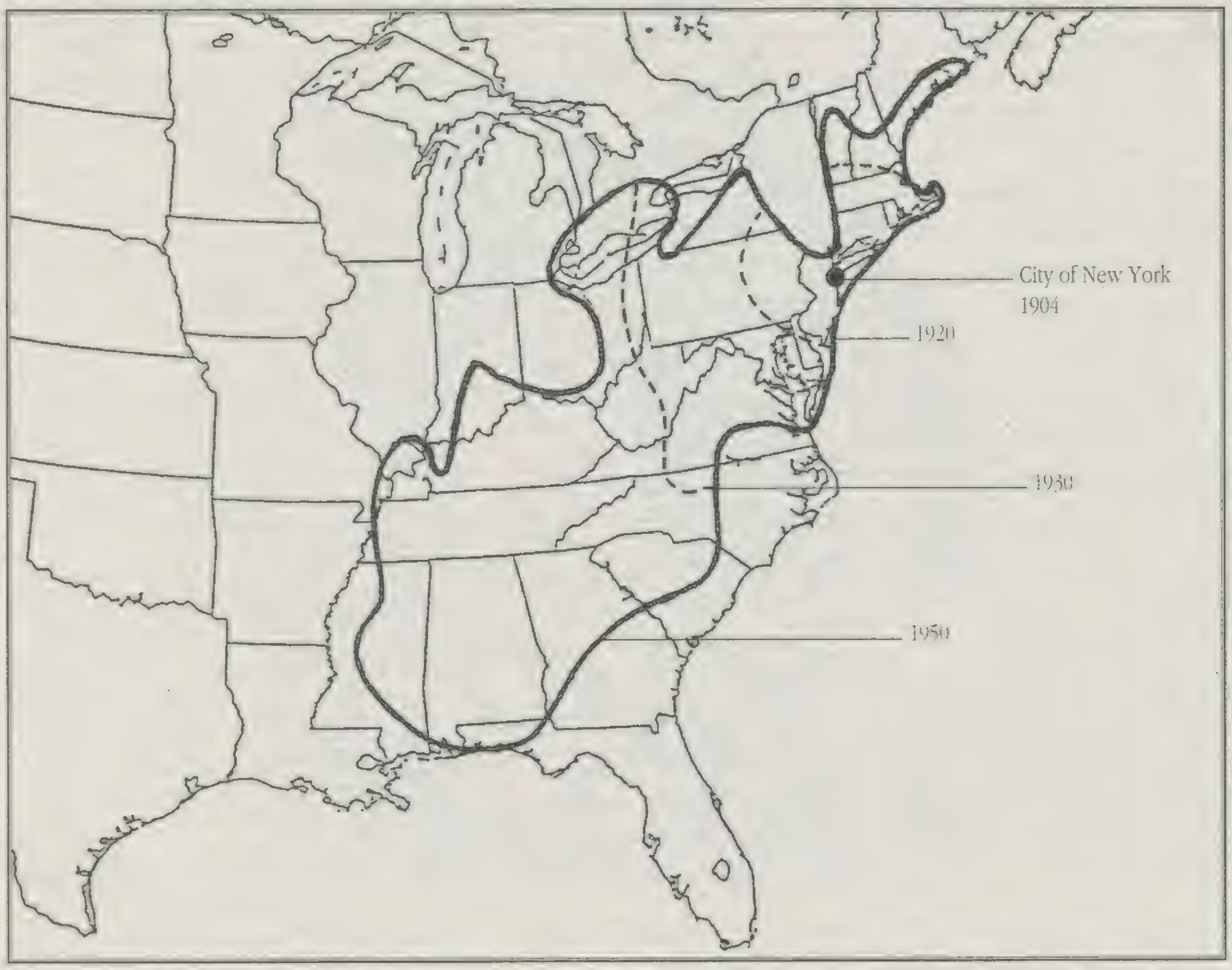
considerable damage. Fifteen years later, chestnuts were found in Italy that survived the blight epidemic, and, in 1964, it was confirmed that these trees survived not because they were of a resistant variety, but because the pathogenic organisms were modified forms of *Cryphonectria parasitica* too weak to kill the host organism. These forms, called hypovirulent strains, have curative effects, as it seems they can transform the virulent strains in hypovirulent strains. This discovery spurred on North American scientists to seek out similar forms, several of which have been identified in a number of U.S. states and in Ontario. Virologists subsequently confirmed that viruses infect those American and European hypovirulent strains.

The survival of the American chestnut depended on the dispersal of these forms, be they introduced by humans or produced naturally, in its range. Once the hypovirulence is established, every organism found on the trunk of this species spreads it in the area infected by the chestnut blight.

Production of more disease-resistant hybrids of the Asian chestnuts is another solution sought by researchers. Testing is being carried out with the Chinese chestnut (*C. mollisima* Blume) and the Japanese chestnut (*C. crenata*) because these species are more resistant to the blight than the American chestnut. First generation backcrosses (*C. mollisima* x *C. dentata*) x *C. dentata* have given encouraging results. The trees thus produced show an increased resistance to pathogens, almost equal to the resistance shown by the Asian species. Molecular biology also offers another possibility. The identification of the gene responsible for the resistance to the blight and its inclusion in the genetic material of the chestnut could lead to the production of blight-resistant trees.

Lastly, naturally produced hybrids should not be ignored. As cross-pollination can occur in all chestnut species, it is possible for an American chestnut to live long enough to produce flowers and cross with one of the thousands of Asian chestnuts introduced or gone wild. Such crosses would produce more resistant trees.

Hopes are high as far as the control of the chestnut blight is concerned, but the battle will be long and hard. The implementation of a biological control strategy will accordingly be more efficient if we succeed in the development of hypovirulence, thus increasing disease resistance. That way, the reintroduction and growth of the American chestnut will be facilitated.



It was in 1904, at the New York Zoological Garden, that the ravages of the blight were first noticed. In less than 50 years, the disease had spread over the whole range of the American chestnut.

The American chestnut once flourished in North America until decimated by an Asian fungus accidentally imported on a related species in the early 1900s.

But the fight is not over yet: *Dryocosmus kuriphilus* Yasumatsu, an insect species indigenous to Korea and Japan and resembling a tiny bee, threatens ornamental and indigenous chestnut species. It is thought that this insect came to North America on branchlets or young shoots brought back from trips abroad. It causes the growth of galls—a swelling of plant tissue as a defence against the presence of insect eggs or larva. A serious infestation slows the growth of the tree and often ends in its demise. Since 1974, we have been powerless witnesses to the decimation of vast plantations of Chinese chestnut in Georgia. More recently, the presence of that insect was confirmed on indigenous chestnuts. As with the blight, the dispersal of this pest is fast. Unrestricted, it can spread wherever chestnuts grow.

The reintroduction of healthy trees will not take place in the near future. The stately chestnut forests of yesteryear will not be back for quite a while. Oak and other deciduous trees have already filled the ecological void left by the decimation of the chestnut population. In the meantime, we must protect all the American chestnuts left in order to conserve the genetic diversity of the species. This stately tree is part of our heritage. We must also educate the public concerning the introduction of exotic species. By correcting past errors, it is easier to see what is yet to be done. I hope that the government, be it Canadian or American, will continue to support these research programs.

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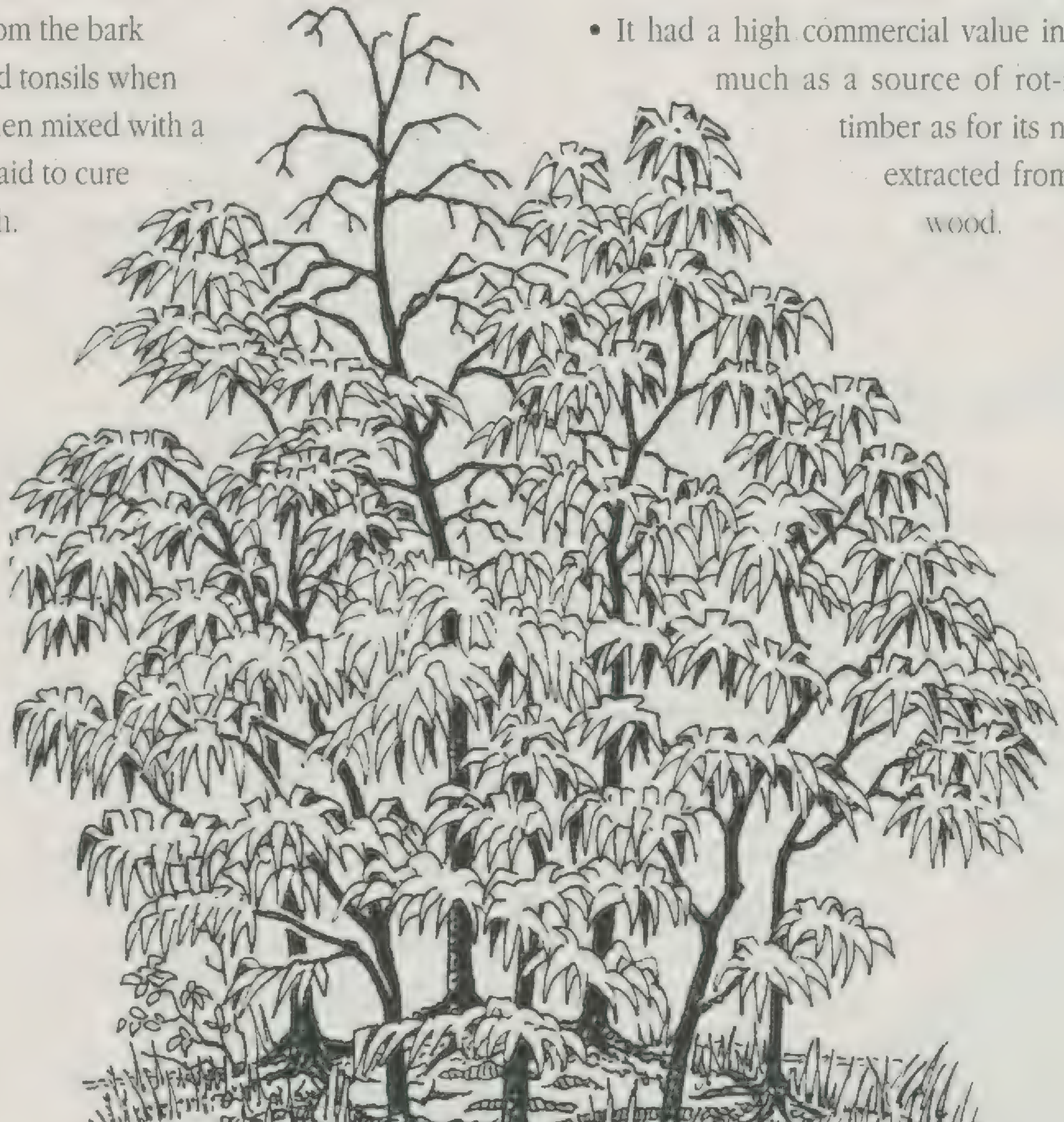
Canadian flora at risk: some facts

Vascular plants	Species	% At risk
Indigenous to Canada	3269	
At risk in Canada	1009	31%
At risk in British Columbia	426	13%
At risk in Ontario	355	11%
At risk in all other provinces	228	7 %

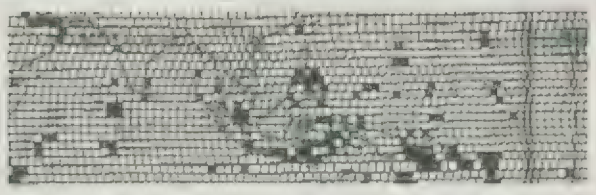
Of the 31% of the Canadian indigenous vascular plants that are at risk, 24% of them are concentrated in two provinces: Ontario and British Columbia. Many of these plants have always had a restricted distribution in Canada, as they occupy the northern limit of their range. As well, they are found in densely populated areas; with time, they have been decimated by industrialization, urbanization, and agriculture.

DID YOU KNOW...

- According to folklore, a jelly made by boiling the leaves eases burns and sweaty feet;
- a tea made from the bark soothes inflamed tonsils when gargled, and when mixed with a little honey, is said to cure whooping cough.
- In bygone days, the nuts were an important source of food for wildlife and American Indians.
- It had a high commercial value in North America, as much as a source of rot-resistant structural timber as for its nuts and the tannins extracted from the bark and the wood.



Today, the Amerian chestnut survives in the form of suckers growing from the roots of diseased trees.



TOOLS FOR CONSERVING BIODIVERSITY: INVENTORIES, BIOSYSTEMATICS, MUSEUMS, TAP, RAP, GAP, ETAP, AND ATI.

A species at a time is too slow!

The effective choice of areas to conserve biodiversity requires good science, biosystematics, and ecology, good geographical distribution data, biological inventories, and voucher collections. That data then needs analysis by appropriate tools: TAP and RAP for urgent decisions; GAP, ETAP, and ATI for medium- and long-term choices. [D.E.M.]

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INTRODUCTION

Many of the scarce resources currently available for conservation are spent on identifying individual threatened species and on individual recovery plans. Canadian information suggests that at least 5% of vertebrates and 30% of vascular plants are rare, threatened, or endangered (Mosquin *et al* 1994). Applying these percentages to lower plants, invertebrates, and microorganisms suggests that many thousands of other biota are at risk. Costs for conservation of these large numbers of species is beyond the present individual species recovery program resources. This paper suggests that alternative approaches and new inventories and research are needed to provide the knowledge and tools to conserve clusters of species or the best areas of ecosystems.

WE NEED MORE INVENTORIES

Inventories provide the basic taxonomic, ecological, and geographic information essential for making wise choices to protect and sustainably use biodiversity. Inventories answer where species are found. The ranges of many species are imperfectly known. While the ranges of some species have shrunk, others — especially those of introduced and weed species — have grown. Adequate inventories are lacking for most areas of the globe, and thus, weaken efforts to conserve and use biodiversity. Even in highly developed countries such as the United States, inventories are incomplete. Fortunately, the new U.S. administration has given high priority to a national biodiversity inventory (National Research Council 1993, *A biological survey for the nation*). Costa Rica has already begun a complete inventory of its species under INBio with the help of scientists, parataxonomists, and a computer-based recording system of information.

Inventories should cover as many taxa as resources permit, including plants, animals, and microorganisms from the five kingdoms and the viruses. Different taxa have different hotspots — areas of high species or taxonomic richness. For instance, Figure 2 in *Canadian biodiversity* 1 (1), p. 25 shows how coniferous trees are twice as common in western as in eastern Canada, while for deciduous broad-leafed trees the reverse is true. There is more discussion of this hotspot phenomenon in Predergast *et al* (1993) and McAllister *et al* (1994).

Two key approaches to inventory should be emphasized:
1) sampling in a geographically regular grid pattern, and
2) the collection of voucher specimens for deposition in biosystematics collections.

Grid-based sampling ensures that areas are evenly sampled and patterns reflect natural distributions (not the bias from roads or river access, closeness to research centres, etc.). The deposition of voucher specimens in collections permits their identity to be verified at a later date, provides the material needed for biosystematic studies, and forms the basis for a documented national biodiversity database. Parataxonomists can enhance collecting at the regional level, applying their familiarity with the localities.

As of yet there is no place on Earth where we know all the species that are present.

WE NEED MORE BIOSYSTEMATICS RESEARCH

Biosystematics provides a framework for both information storage and the retrieval systems for science, resource management, and industry. It also provides a predictive basis to infer knowledge about unstudied taxa and underpins the writing of popular guides, which increase awareness and appreciation of biodiversity and promote ecotourism. Biosystematics research authenticates specimens in scientific collections, which in turn, serve as verifiable vouchers for national biodiversity data bases.

Presently less than 50% of Canada's and less than 10% of the world's species are discovered, named, or classified. Research is needed so it can lead to up-to-date monographs, national and global catalogues of species, and identification manuals. But the number of biosystematists (taxonomists) is declining according to the Canadian Biosystematics Task Force and the American *Systematics Agenda 2000: Charting the Biosphere.* This trend needs to be reversed.

BIODIVERSITY DATA BASES

Knowledge from collections and the existing literature, plus new data from inventories, could be stored in more all-encompassing national biodiversity data bases to serve those in research, conservation, and resource management. At the present time, the most significant data bases belong to Nature Conservancy and the Royal Ontario Museum. The Canadian Museum of Nature is also working on perfecting its national data base, but there is no truly national operational data base as of yet.

In national data bases, the biological data should be tied, wherever possible, to specimens or literature citations. When the job of describing biodiversity is so incomplete, it is important to have a specimen that can be re-identified whenever new species are discovered, so that the data can be tied to the correct species. The data base should be linked to user-friendly computer systems capable of geographic analysis (geographic information systems or GIS) and production of maps. Data bases on topography, bathometry, ecosystems, human populations, and the uses and impacts of both land and sea could then be linked to the biological data layers.

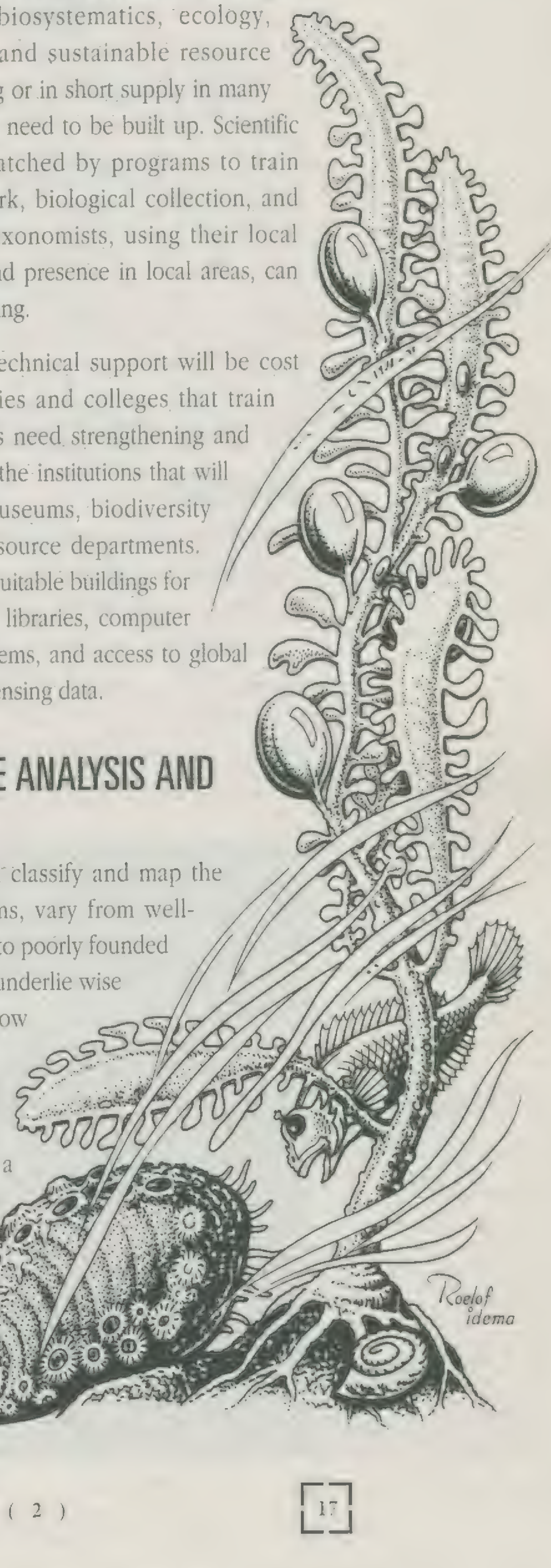
WE NEED TO STRENGTHEN OUR INSTITUTIONS AND TRAIN MORE PEOPLE

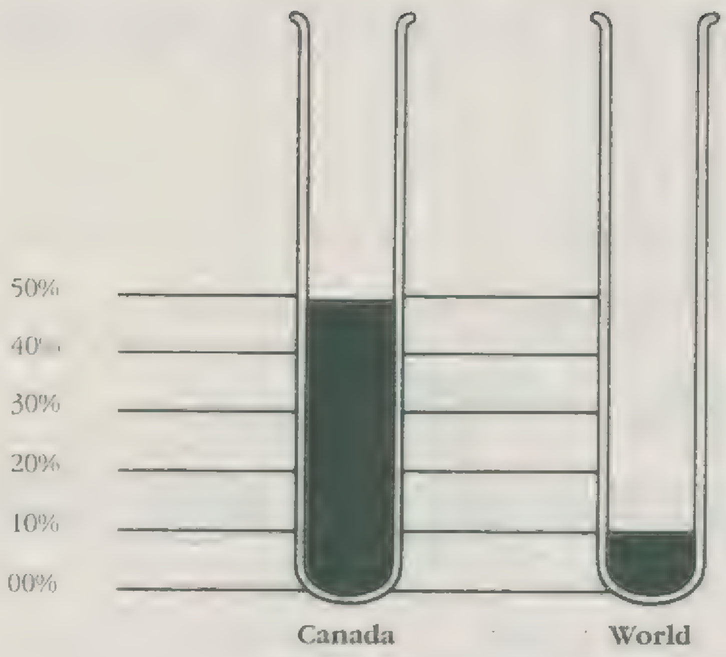
Human resources in biosystematics, ecology, conservation biology, and sustainable resource management are declining or in short supply in many countries. These certainly need to be built up. Scientific programs should be matched by programs to train technicians for field work, biological collection, and laboratory work. Parataxonomists, using their local knowledge and year-round presence in local areas, can enhance specimen collecting.

In the long run, good technical support will be cost effective. The universities and colleges that train scientists and technicians need strengthening and sustained support, as do the institutions that will house the graduates: museums, biodiversity institutes, parks, and resource departments. "Strengthening" includes suitable buildings for research and collections, libraries, computer and communications systems, and access to global networking and remote sensing data.

WE NEED ECOZONE ANALYSIS AND MAPPING

Ecozone systems, which classify and map the occurrence of ecosystems, vary from well-established to conflicting to poorly founded or non-existent. Yet they underlie wise conservation choices. How can we conserve ecosystems if they are only crudely classified and mapped? There is a need to resolve the differences in classifications. In addition, research to properly establish weak





Biosystematics Research
Percent of Species Discovered

or non-existent classifications needs to be high priority, such as those for a number of marine regions. If soundly established ecozone systems were widely accepted, data would be comparable nationally and globally. Then there would be greater assurance that the Earth's ecozones were protected.

WE NEED RAP, TAP, GAP, ETAP, AND ATI ANALYSES

Using the data from biological inventories and ecozone mapping can aid in selecting areas for protection. This can include areas under immediate threat for possible conservation or to assist in the selection of ecological areas under a long-term program for the conservation of biodiversity. There are several tools that will assist in these goals, but research is needed to enhance these biodiversity conservation tools mentioned below.

RAP or Rapid Assessment Program, developed by Conservation International, is a tool used to rapidly evaluate whether a tropical area under immediate threat is worth saving (Connif 1991). The RAP results can be compared with those for other areas to see if the biodiversity is high enough to warrant action. RAP teams often include a few taxonomic experts in groups such as birds, mammals, and vascular plants or in rain forest ecology. By choosing groups in which the taxonomy is well known, ready identification to a species level by especially qualified experts is assured, although such experts are rare, and the recent plane crash that killed several RAP experts was a tragedy for conservation of neotropical rain forest biodiversity. The concept does not have to be restricted to the tropics. It could have been applied, for example, to the choice of area to be protected in Clayoquot Sound, Vancouver Island instead of the less scientific approach chosen.

In areas of moderate diversity, it is possible to record the calls of vocal organisms and to identify them using computerized pattern recognition systems (Patrick *et al* 1993). Using this new computerized approach, a census could be made of birds, frogs, crickets, bats, whales and dolphins, certain fishes, and other species of sound-producing creatures. Calls of unknown species or new calls of known species can be flagged for later identification. Silent periods in the recording can be condensed before analysis by the computer (or by humans). Visual, olfactory, or electrical signals could also be automatically recorded and analyzed.

One species at a time is too slow! If we are to conserve the biodiversity of the Earth—whether it is found in a prairie or an underwater kelp forest or a tropical forest, we must support and use a variety of conservation tools.

Photo by
Dr. Donald R. Gunn

TAP or taxonomic assessment process, is a variant of RAP that is being developed by European and Canadian researchers (Williams 1993; McAllister *et al* 1994). It surveys a wider assortment of taxonomic groups (adding, for example, invertebrates, lower plants, and microorganisms). TAP, unlike RAP, can use a level of identification of specimens down to genera (or just to families). Surveying a wider assortment of organisms means that there is less chance for an area rich in a particular group of organisms to be overlooked. Studies on vertebrates in the U.S. and many taxa in the U.K. have demonstrated that different taxa may have different hotspots, areas rich in species or higher taxa. For instance, the richest areas for African birds do not match the richest areas for endemic mammals (Bibby *et al* 1992), although there is general overlap of areas for endemism for the two groups.

Studies of land and marine organisms have shown that the number of species in a given area is correlated with the number of genera or families. When higher taxa, such as families, are used as surrogates to estimate the numbers of species, the identification process is quicker, and for lesser known groups with many undescribed species, the identifications are more likely to be correct. So identification to the higher taxonomic level has a number of advantages, especially in high diversity tropical areas where the biota are poorly known.

GAP analysis uses vegetation types to estimate the variety of wildlife likely to occur in an area (Miller and Griffen 1994). Vegetation maps, aerial photos, or satellite images may be used as sources of information. In order to be successful, gap analysis requires prior knowledge of the habitat requirements of wildlife or their associations with vegetation. Good results from gap analysis require good vegetation mapping, ground truthing, and well-founded correlations between wildlife and vegetation. It is useful in moderate term responses to conservation needs, while RAP and TAP can be used to respond to threats in the short term.

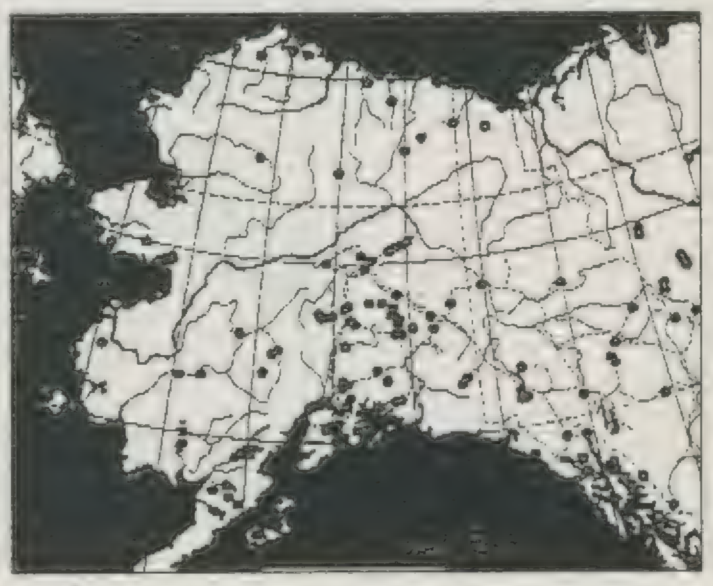
ETAP or Eco-Taxa Hotspot Analysis Process is used to compare prospective sites for the preservation of a given ecosystem and the establishment of nature reserves or parks. In this process, ecosystems may be local areas, or broader landscapes, aquascapes, or seascapes (Vane-Wright *et al* 1991). Using an equal-area grid, data are plotted for selected species in various taxonomic groups. Totals for the number of species in each taxon or group of taxa can then be calculated for each "square" in the grid. Hotspots will show up as clusters of adjacent squares with high numbers of species, endemic species, or combined counts for species, genera, families, or clades (clades are groups including all the descendants of a common ancestor).

Studies have shown that not all species in a group need to be analyzed to locate hotspots. Hotspots located with 311 (40%) and 501 (65%) of 775 freshwater species from U.S.A. and southern Canada coincided with one another and largely agreed with areas of endemism (McAllister *et al* 1986). Additionally hotspots for combined levels of taxa may differ from those based on species and provide a richer measure of biodiversity. For instance, an area with a Black Duck and a Peregrine Falcon is more valuable than an area with Black and Mallard Ducks because genera and families usually differ more trenchantly in genes, structure, physiology, ecological requirements, and behaviour than two species in the same genus. ETAP hotspot analysis thus combines knowledge from the two great themes in biology—ecology and taxonomy—in order to select highly biodiverse areas.

ATI or All Taxa Inventories attempt to inventory all species in all five kingdoms of plants, animals, and microorganisms in the chosen area. Each country should consider carrying out ATIs for at least one prime terrestrial, marine, and freshwater site. At present, there is yet no place on Earth where we know all the species and how they interact.

BEYOND ECOSYSTEMS

No protected area is an island. Ecosystems, although they have internal integrity, are part of larger wholes—landscapes, "aquascapes" (freshwater landscapes), and "seascapes" (marine landscapes), or generically, "ecoscapes" to encompass all of these (McAllister 1992). So a protected area must take account of all the inputs and outputs transported by gravity, wind, or water from the surrounding ecoscape. For example, if the nearby mangrove swamp is razed, thus effectively removing the filter for movement of silt and freshwater, the coral reef will surely go, too. Protected area planning must also take account of the movement of organisms. What is the good of protecting the



By seeking hotspots, or areas in which large numbers of taxa exist, areas to protect can be better chosen. This map shows the locations of the species *Salix artica*.

Multiple-species conservation tools for selecting protected areas or research

Tool	Purpose	Biological Basis	Areas Studied	Time Frame
RAP Rapid Assessment Program	Rapid evaluation of a threatened area to see if it is worth conserving	Field identification of a few taxonomic groups down to the species level, supplemented by other data sources	Areas under immediate threat, i.e. flooding by a dam, clearcutting, airport construction on a coral reef	Short
TAP Taxonomic Assessment Process	Rapid evaluation of a threatened area to see if it is worth conservation	Field identification of a number of taxonomic groups down to generic or family species level, supplemented by other data sources	Area under imminent threat, i.e. flooding by a dam, clearcutting, airport construction on a coral reef	Short
GAP Analysis	Map areas for protected-area or land-management planning	Use remote-sensing and other sources of vegetation and landform information, verified by ground-truthing	Political or other geographic units	Medium to long
ETAP Ecotaxa Hotspot Analysis Process	Seek hot spots of a number of taxa within a selected ecozone to choose the optimal site(s) for protected areas	Map taxonomic (species, genera, family levels) distribution in ecozone to find hotspots of a number of taxa	Ecozones within a political or geographic unit	Medium to long
ATI All Taxa Inventory	Explore all taxa in one area biosystematically and ecologically to better understand the complexity of nature	Identify and map occurrences of all taxa in the study area, study ecological linkages	Relatively small selected national or global study area	Medium to long

Monarch butterfly winter habitat in Mexico if its summer habitat of the milkweeds of United States and Canada are decimated by agricultural practices? Likewise, protecting the alpine habitat of mountain sheep is for naught if their lowland wintering habitat is lost through fencing or farming.

Buffers and corridors may be needed to allow for life histories or migrations, such as these, to be carried out. These corridors could also provide the minimum area for survival of shy or timid species. Island biogeography theory and experiments, which have been carried out in minimal areas for protection of tropical rain forest biota, need to be applied to a variety of Northern as well as Southern landscapes, aquascapes, and seascapes. Some buffers and corridors already exist, but may need to be modified so as to link protected areas that will permit movement of biota under pressures from climatic change – impacts from temperature, rainfall, salinity, etc.

In the larger picture the protected ecoscapes must fit into and adequately represent the ecosphere in all its variety. Adequate representation means more than just a "Noah's Ark" philosophy with two of each kind or some minimal genetically computed number for simple survival of every species. Why? Because biodiversity performs ecological services for regions and the entire planet.

WE NEED RESEARCH ON ECO-FUNCTIONS

Ecological functions or ecological services (sometimes called eco-services) are those services one or more species provides to other species. Eco-functions serve or sustain individuals, species, local ecosystems, regional landscapes and seascapes, and the planet (Jarzen and McAllister 1993; Mosquin 1994). Eco-functions include production of oxygen, carbon banking, production of food using solar energy, creation of three-dimensional habitat, hydrological cycle and climate moderation, etc. The variety, area, or biomass of biodiversity necessary to sustain the ecological functions has been poorly studied, aside from a few like carbon banking. Yet eco-functions are essential to maintain planetary life support systems and to reduce regional disasters like flooding and wave damage. National and international research is desirable to establish the variety, biomass, and geographic distribution of biodiversity needed to sustain these eco-functions. In short, we still need to write the operating manual for the planet Earth.

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Preserving wood and biodiversity

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Some manufactured wood preservatives are toxic. Are there natural wood preservatives that are effective but non-toxic or selectively toxic?

The qualities of different woods include strength, flexibility, beauty, fragrance, and so on. These qualities lend themselves to many purposes: houses, fence posts, sculpture, furniture, tool handles and many others. In some of these roles, wood is subject to decay by mildew, fungi or other microorganisms, or is attacked by insects such as termites, ants, and beetles. A number of preservatives have been developed to protect the wood. Some of these such as lead paints, creosote, borate, and chromated copper arsenate (CCA) are toxic to more than the target pest species.

Some of the woods are pressure treated with CCA, coloured green, and guaranteed for 20 or 30 years against rot, a rather tempting guarantee. On the other hand, CCA is toxic and should not be used near food-growing soil, soil life, plants, humans, or presumably wildlife (Long and McGrath 1994, and American and Canadian techical reports cited therein). Studies show that copper and arsenic leach from the wood or can be transferred through skin contact with the wood in playground equipment. If burned, copper and arsenic occur in both ashes and smoke.

Living trees, or their non-living heartwood, are also subject to attack by decay and insects, and so, it is natural that they have developed defenses against bio-deterioration. The tannins, pitches, and oils found in the bark or outer wood of certain trees do indeed discourage some kinds of microorganisms and insects. Could these natural preservatives be an alternative to some of the manufactured toxic preservatives? One of many possible examples is now described:

In the highlands of East Africa south of Lake Nyassa is found the Milanji cedar, *Widdringtonia whytei*. Growing under moist cool conditions this tree reaches about 45 metres in height and nearly 2 metres in diameter (Everett 1969). Not true cedars, these cone-bearing evergreens possess olive-green foliage and a thick yellow resinous sap that gives off a heavy but delicious scent (van der Post 1957). This sap is flammable, and as a result, the Milange forests have been threatened by fires since humans moved into the area centuries ago. But this same sap, according to van der Post, makes the wood resistant to pests, "...no insect, no worm, no ant would touch even the driest morsel of it. It was the only ant-resisting wood in the whole of Africa." Surely the repellent qualities of this sap deserve study and the Milanji cedar deserves protection?

A natural wood preservative could be developed from such a tree species, either as a natural extract (like rubber and turpentine) or modelled upon the molecular structure of the repellant. If commercially successful, then an agreement on sharing the benefits with the country of origin and the country of development would live up to the spirit of the Convention on Biological Diversity. At the same time, such an example would foster a climate for similar developments in the future in addition to encouraging biodiversity-rich countries, many in the South, to conserve their biodiversity. This is just another example of how biodiversity conservation could benefit both the South and the North.

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Milanji cedar, *Widdringtonia whytei*

The beautiful, fragrant Milanji cedar of East Africa contains a sap that makes the wood resistant to ants, a scourge to wood structures in the tropics. Could this sap be made the basis for an effective but environmentally friendly wood preservative?

THE HUMAN GENOME DIVERSITY PROJECT AND PATENTING HUMANS:

Genetic imperialism?

Long exploited for their labour, sex, skills, and pharmaceutical and other knowledge, indigenous peoples now feel threatened by genetic exploitation: their very genes may be patented and any benefits will "belong" to the organization filing for the patent. Indeed this is bolstered by a California court decision that denied a man any right to commercial benefits derived from a product based on his liver cells. Industry may argue that knowledge from these studies may benefit all inhabitants of Earth (as well as their own pockets), and national and transnational corporations defended intellectual property rights (patents, copyrights, etc.) before the Convention on Biological Diversity and GATT. Anthropologists may argue that they are interested only in the knowledge about genes, so that they can trace the origins and history of humanity and have no intention of exploiting indigenous peoples. Ethics specialists may suggest that informed consent is needed before taking tissue samples for genetic analyses. Others debate whether simple discoveries of existing natural "objects," genes, or species, are really inventions and patentable. Northern patenting and unilateral profiting from the genes of southern indigenous peoples would seem to contravene at least the spirit of the International Convention on Biological Diversity that promoted the sharing of benefits and technologies between North and South. Would it not be strange to suggest that human genes were to be treated differently than the genes of animals and plants? But let us listen to the views of the Cordillera Peoples' Alliance. [D.E.M.]

The Canadian Museum of Nature is pleased to provide an open forum for diverse viewpoints even though they may not represent the views of the Museum itself. Comments on these viewpoints are encouraged. Please mail or fax them to Don E. McAllister (address on inside front cover).

The Cordillera Peoples' Alliance
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Scientists and anthropologists from prestigious universities in North America and Europe recently launched the Human Genome Diversity Project (HGDP). The project seeks to collect blood, tissue, and hair samples from "endangered communities" all over the world. On 29-31 October 1992, the second Human Genome Diversity Workshop was held at Pennsylvania State University, and participants drew up a preliminary list of 722 indigenous peoples' communities for DNA sampling. The target is 20,000 samples, representing 0.01% of the world's 200 million indigenous peoples.

The proponents of the project are Luigi Luca Cavalli-Sforza of Stanford University and Kenneth Kid of Yale University. In an article written by Cavalli-Sforza *et al* in *Genomics* 11 (1991), they said, "We call upon geneticists and public and private agencies to collaborate now in collecting sufficient material to record human ethnic and geographic diversity before this possibility is irretrievably lost.... Isolated human populations contain much more informative genetic records than more recent urban ones."

The article further says, "...Among the indigenous populations of great interest are peoples of the Sahara, of eastern, western and southern Africa, the Etas of Japan, insular populations of Malaysia and southeastern Asia, ethnic minorities of China, Polynesians, aboriginal populations of Australia, Lapps, etc."

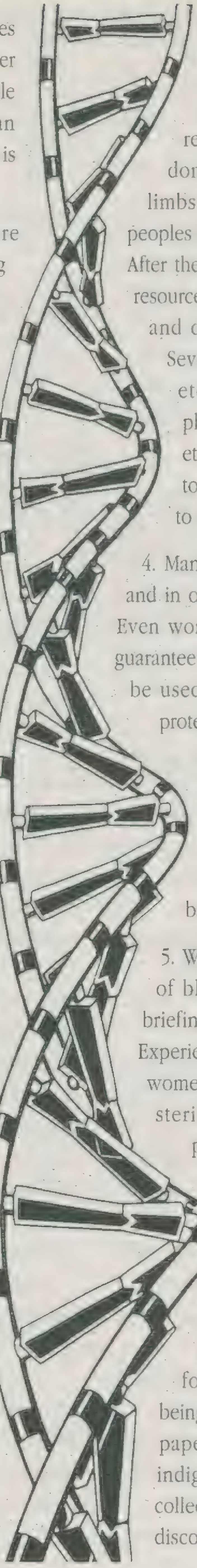
The Cordillera Peoples' Alliance (CPA), an alliance of 120 indigenous peoples' organizations in the Cordillera region in the Philippines is calling for a halt to this project. While the HGDP believes that this will lead to a better understanding of the "genetic diversity of people and may lead to clues in the evolution of our species"

(Cavalli), the CPA fears the potential consequences of said project. In June 1993 the CPA sent a letter to the United Nations Commission on Sustainable Development and the Commission on Human Rights stating their position. An edited version is below:

1. Collecting DNA, etc., is merely a more sophisticated form of collecting and preserving indigenous peoples. There are already around 18,500 remains of indigenous peoples stored in the Smithsonian Institution alone, and we consider this sacrilegious and a violation of indigenous peoples' rights. While indigenous peoples are demanding that these remains be returned to them, the processes are tedious and controversial. We, Igorots in the Cordillera, have not yet been able to reclaim the mummies taken from our burial caves. And yet, while this problem remains unresolved, another more sophisticated form of collection and preservation of indigenous peoples comes along without appropriate consultation.

We do not view common heritage in terms of property rights or for the purpose of generating profits. Heritage is intertwined with reciprocal relationships with people, animals, plants, or the whole cosmos.

2. After the genocide and ethnocide committed against indigenous peoples for 500 years, *which is why we are endangered,* the HGDP becomes a way of preserving us. Why don't they address the causes of our being endangered? Instead of spending $20 million for 5 years to collect our blood, tissues, and hair, this money could be used to provide the basic social services we need for survival. In addition, the money could be used to protect our rights as indigenous peoples. The aggressive moves of the proponents to raise resources from public and private agencies for this project will jeopardize further the funding of more crucial projects. Foreign aid might be diverted to finance this "exciting" project. If our rights are protected, then there is no need to panic over the fact that we are disappearing.



3. The biodiversity and cultural diversity, which are largely found among us and within our ancestral territories, remain because we resisted onslaughts by colonizers and by the dominant development model. The lives and limbs of hundreds of thousands of indigenous peoples have been sacrificed to maintain this diversity. After the rest of the world has squandered their own resources, suddenly the biodiversity that we preserved and developed becomes a "common" heritage. Several of our seeds, medicinal plants, insects, etc., have already been appropriated by pharmaceutical companies, research institutes, etc. Benefits and profits hardly ever come back to us. Now, even our very own selves are going to be appropriated.

4. Many research projects done among our peoples and in our lands have not been returned back to us. Even worse, they have been used against us. What guarantee do we have that this research project will not be used against us, once more? If they discover proteins in our DNA, which either cause resistance or vulnerability to specific diseases, how will such discoveries be used? The potential exists for such findings to be used for biological warfare, to produce super human beings, or to develop drugs that will be sold back to us. Who will benefit from all these?

5. What guarantee do we have that the collection of blood, tissues, etc., will be done with full briefing to the people who will become subjects? Experience in the past has shown how indigenous women were not informed that they were being sterilized or that Depo-Provera (a systemic progestin-based contraceptive and menstrual regulator) had been injected, etc. Most probably, our poverty will be taken advantage of and we will be offered money to allow ourselves to be scraped of tissues.

6. Finally, we are against patenting of any life forms, be these plants, animals, or human beings. Patenting has not been mentioned in the papers, but look at what happened when our indigenous seeds, medicinal plants, etc., were collected. Is it so far-fetched to imagine that the discoveries will be submitted for patenting? The

Convention on Biological Diversity, the Biotechnology Chapter of Agenda 21, and the trade-related intellectual property rights (TRIPS) of GATT will facilitate the issuance of patents to developers of biotechnology.

We do not view common heritage in terms of property rights or for the purpose of generating profits. Heritage is intertwined with reciprocal relationships with people, animals, plants, or the whole cosmos. The appropriation of our knowledge, resources, and bodies, to be used for profits, contradicts our world view and ways of life. Too much of what we value most have already been lost or eroded because of the impositions of the market-economy development model.

The HGDP, which aims to preserve this common heritage, will actually destroy it because it will store us in cold laboratories. The most effective way to ensure that we are here to stay is for the world to respect and promote our right to self-determination, to respect our rights as indigenous peoples, to respect our rights over our ancestral territories and resources, our indigenous culture and traditions, and our social and political structures.

We call for a review of initiatives like the HGDP. The CPA demands that the project be stopped. The pursuance of this project will definitely lead further to the violation of our human rights. The process of storing the DNA of indigenous peoples can make movies like *Jurassic Park* come true. What can stop scientists from developing super human beings or monsters from these stored proteins? What can stop scientists from developing weapons for biological warfare from out of these genes? What can stop transnational corporations from applying for patents for these genes that they have altered and eventually will be beyond the reach of the peoples who were the original source?

We are appealing to other indigenous peoples and nations to raise this issue, discuss this among themselves, and come up with their own positions. We are appealing to other non-government organizations to support our demand to stop this project.

Signed,
Victoria Tauli-Corpuz
Chairperson, CPA - Philippines
21 June 1993

ENDORSING ORGANIZATIONS AND INDIVIDUALS:

1.Selwyn Katene - National Maori Congress
2.Rusel Barsch - Four Directions Council - Mikmaq Nation Grand Council
3.Martin Khor - Third World Network
4.Kirsten Dawkins - Institute for Agriculture and Trade Policy - USA
5.Women's Environment-Development Organization (WEDO)
6.Kenny Bruno - Global Network Against Toxics
7.Essma Ben Hamida - ENDA inter-arabe TUNISIA
8.Taoufik Ben Abdallah - ENDA Tiers Monde DAKAR-SENEGAL
9.Houria Tazi Sadeq - Société Marocaine pour le droit de l'Environnement - Maroc
10.Tariq Banuri - Sustainable Development Policy Institute (SDPI), Islamabad, Pakistan
11.Sahabat Alam Malaysia
12.Asia Pacific People's Environment Network (APPEN) - Malaysia
13.Latin American Youth Network for Sustainable Development
14.Association for the Promotion of Ideas on Development (APID - Costa Rica)
15.Maria Eugenia Bustamante - Sociedad de Amigos en Defensa de la Gran Sabana (AmiGranSa - Venezuela)
16.Boletin de los Grupos Ambientalistas "RENACUAJO" (Venezuela)
17.Instituto Sol Mineiro de Estudos e de Conserval da Natureza (Brazil)
18.Frente em Defensa da APA da Mantiqueira (Coalition with 15 NGOs) - Brazil
19.World Rainforest Movement - Malaysia
20.Achoka Awori - KENGO - Kenya
21.Pan African Movement - Lagos, Nigeria
22.Environmental Protection Society, Malaysia
23.REDES CA-FUNCOD - Nicaragua
24.SONED - Africa Region
25.Cynthia Chou - ENGENDER
26.Prisca Molotsi - Zambia
27.CODEFF - Chile
28.Pan African Movement - Puerto Rico
29.Waldaba Stewart - Pan African Movement - Panama
30.Dr.Pauulu Kamarakafego - Pan African Movement - International
31.Jocelyn Dow - Red Thread Women's Development Programme - Guyana
32.Caribbean Network for Integrated Development - Trinidad
33.Atherton Martin - Caribbean Policy Development Center - Dominica
34.Esmerelda Brown - Panama
35.Tsehai Berhane-Selassie - World Council of Churches - Ethiopia
36.Andrew Simmons - Caribbean Youth Environment Network
37.Rene Encarnacion - HARIBON Foundation for the Conservation of Natural Resources
38.Anna Marie Quiroz - International Council for Adult Education

Have you got a ten-word-or-less definition for the environment?

Clearly understanding what we mean by the word "environment" is important whether we wish to save it or sustainably use it. Interestingly, Michael Moore (presently Executive Director of the Port Hardy Marine Resource Management Society in British Columbia) does not report use of the word "natural" in the definitions he has solicited in his survey. [D.E.M.]

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Social movements are the result of collective points of view. The environmental movement, however, might actually be the result of a collective "absence" of a point of view. Now, before you get your hackles up and pigeonhole me as another blind, rape-the-Earth consumer, consider two things:

One, stop reading, and formulate your response to the question in the title. Get a clear grip on your answer, ten words or less. Got it?

Two, listen to why I would say such a thing about the movement to save the planet. I am not an outsider to the issue. Since the early '70s, I've watched my brother, noted ecologist/activist Patrick Moore, through his years of creating Greenpeace, fish farms, Provincial Round Tables, and Forest Alliances. I've spent ten years travelling the world, looking and learning. I've worked in the forest industry, in marine aquaculture, and recently with a group devoted to sustainable development of marine resources here in coastal British Columbia.

Over the last four years, I have asked the title question to well over 500 people. I have always asked in conversational settings in which the discussion could be explored in detail. Surprisingly, I have found that only about one in four people are able to come up with an answer, regardless of their professional or social background.

The participants in this informal survey have included individuals working in the environmental movement, in government policy, in higher education, and in everyday labour. There have been no distinguishing features to any sector. Just one in four who are not completely stymied by the question. The rest will hum, haw, and remark upon what an interesting question it is, often suppressing their embarrassment at the absence of a clear opinion.

I inevitably point out how curious it is that a word that we hear, see, and say every day without fail (for, at least, the last decade) seems to have such a lack of precision regarding its basic meaning. I admit to experiencing a lovely black pleasure if the individual was previously exhorting about the environment with priestlike certainty.

All right, very interesting, you might say, but what about those with a clear answer? This is the killer. People who have a ten word or less response all agree with one another. They all say the same thing.

My Defintion of the Environment

They say, "the world around us," "where we live," "all that touches my skin from inside and outside," "everything I can conceive of," "this place," "our surroundings," "the whole shooting match," "the human envelope," and "everything, everywhere, all the time." They (and you might be one of them) sense the word is a compilation of *en* meaning "within," and *viron* meaning "circle." Within the circle. Everything, everywhere, within the circle, is the environment....

Using straight logic, ponder what this might imply. If only one in four members of our modern society has grasped the fundamental idea of what the environment is, it certainly helps explain the furor of confusion, conflict, condemnation, and arrogance that has characterized the environmental discussion in most cases. When you are not clear as to what you are fighting for (or against), how easy is it to negotiate peace and understanding?

Is the increasing focus on the environment the birth of a new religious movement?

It also explains why individuals in all positions of society seem able to justify why they are "true" environmentalists. Even if they head a multinational, resource-extracting, arms-manufacturing, chemical production company, technically they are being an environmentalist—if they care about anything around them.

Also, remember that science defines itself by studying parts of the universe: geology studies rocks, psychology studies the mind, etc. Science approaches a part of the world with the tools of the scientific method and produces mostly repeatable, useful results. Historically, the study of the *whole* of creation, of everything everywhere, including thoughts, feelings, creativity, and fate, has always been the realm of religion....

When I first started asking my question four years ago, I was able to find only about one in eight who had the basic idea in place. Therefore, the demographics of my informal survey indicate a still very young movement, rather than a temporary fad.

On the basis of straight logic, it seems that we are experiencing the birth of a new religious movement, and given the totality of our dependence on the "environment," and our present capacity to communicate worldwide, it would not surprise me if this movement swept all "traditional" (read previous) religions aside over the next three or four generations.

Of course by then, I, like you, will be the environment.

Photos courtesy of Don E. McAllister

Human nature, culture and conservation

According to the author, an understanding of human nature and a revolutionary change in our culture is needed in order to preserve the Earth. He argues that attitudes on population control, reverence for life of all kinds, economic growth, and ethics need to change if a sustainable global environment is to be attained. [D.E.M.]

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INTRODUCTION

If there is to be a serious effort made to bring about a sustainable global environment, it is imperative that human nature and human culture be central to the discussion. In an essay entitled "Is Humanity Suicidal?" (*The New York Times*, 30 May 1993), E. O. Wilson states, "People are programmed by their genetic heritage to be so selfish that a sense of global responsibility will come too late." Too late for what? Too late to save the Earth as a viable home for *Homo sapiens* and other living things.

It doesn't take very long to find evidence to support Wilson's conclusion. All people have to do is look at themselves and their neighbours with a tinge of objectivity to see the symptoms of selfishness. Even those who express a sincere concern for the environment often appear to be more interested in writing about the plight of the planet, making speeches, or applying for research grants than actually organizing an effort to educate and change destructive human behaviour. This is not to discredit educational efforts or research *per se* for such efforts can be useful to conservation. But sometimes these efforts can be self serving, drain limited resources, and detract from the real work that needs to be done. Nor does it appear, given our present cultural signals, that people will begin acting with pure motives relative to these important issues in the near future. In fact, if the world's great religious traditions haven't been able to inspire such purity, how can one reasonably expect efforts to modify cultural values to bring the desired results?

Reconciling the needs of the world and those of the individual is imperative for saving the Earth.

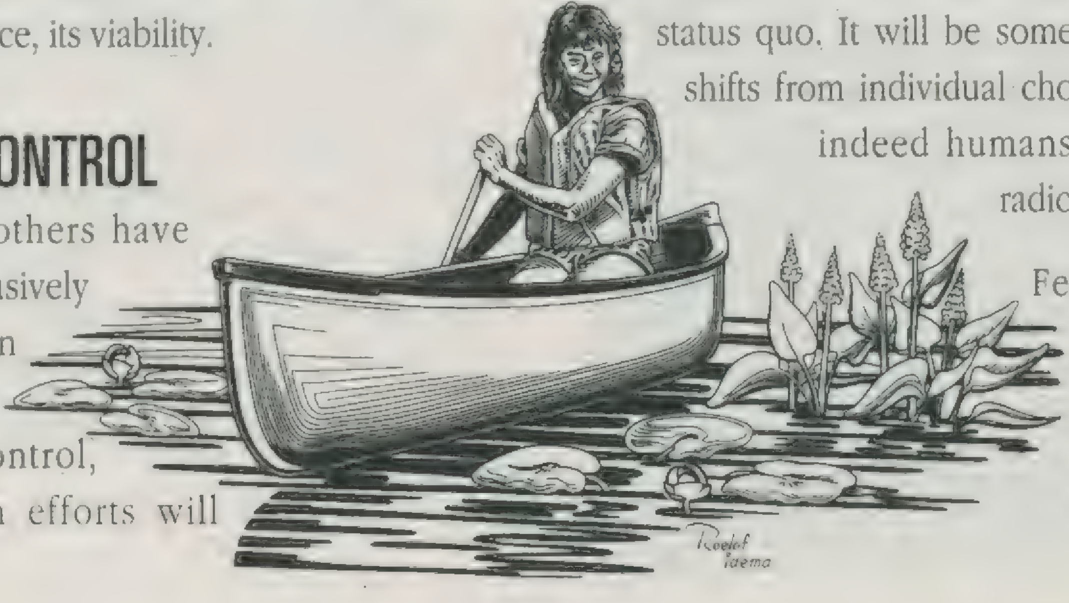
There is a tendency in human nature to be seduced and compromised by recognition and economic rewards after gaining recognition for efforts to make a better world. Just as current civil rights leaders are sometimes accused of using racial bigotry primarily as a career opportunity, the same might be said for those who stroke their egos and receive handsome speaker's fees in the name of conservation.

Examining the private lives of conservationists is even more risky if one expects to see their convictions represented in their daily behaviour. The "Mahatma Gandhi"s of conservation are most likely to be found among high school and college students, but only until they finish their educations. Could these observations, admittedly cynical, define what E. O. Wilson implies as the products of human "genetic heritage"? One suspects that they are. This is only one illustration of the conflicting aspects of human nature. There are many others. It appears that humans possess an intellectual understanding of the need for restraint combined with selfish impulses required for survival and comfort. Such opposing combinations make conservation efforts difficult to accomplish. Still, given the reality of what is about to fall upon humankind, history requires intellect and instinct to be reconciled within the deepest parts of human nature.

If Karl Marx had said that human nature, instead of capitalism, contains the seeds of its own destruction, he might be a more viable philosopher today. Upon reflection, it may be that both capitalism and human nature represent aspects of the same phenomena, in which case Marx might still be right.

All of this places serious doubts on the capacity of humans to assure their future. Indeed, if one were to accept the preceding paragraph as a fully accurate statement about the capacity of people to be dedicated to a task, then who could find fault with those who have given up on the future? Despite the distractions and difficulties, there are many people who commit themselves and make positive contributions to the Earth and are working daily to bring about the cultural changes necessary to support these positive efforts. It is imperative that these positive efforts succeed. Still, it would be less than honest not to observe that most humans have a limited capacity to feel for others, sacrifice, or stick to long-term tasks to achieve the most worthy goal, even if that goal is to save the human race.

If the Earth is to remain viable for all living species, a goal already beyond achievement, not only must humans be realistic about their nature and the role they play in the Earth's degradation, they must look closely at the cultural values that support this behaviour. Humans need to discover ways to foster cultural values that preserve the planet and do so, if possible, in a manner that does not destroy democratic institutions. What follows is a discussion of some of the values that might facilitate movement toward the long-term survival of the Earth's biodiversity, and hence, its viability.



POPULATION CONTROL

Paul Ehrlich and others have demonstrated persuasively that unless human population is brought under control, most conservation efforts will eventually be ineffective. Although many people mention overpopulation as a problem, for the most part, their lifestyle and choices deny the problem. The people of China and India appear to have grappled with limiting population better than those living in less populated countries. However, it is interesting that those people risking their lives to leave China and come to the United States often say they do so because of China's one-child policy. No doubt many people admire their courage and convictions, but at the same time it is clear that China's future depends upon the success of that policy. In their case, as is the case for all humankind, making one more place at life's table contributes to a process that daily puts more strain on limited resources. The result of unlimited population growth is more poverty and the inevitable chaos as social institutions collapse in light of their increasing inability to respond effectively to human needs.

A revolutionary change in cultural thinking needs to happen in order to preserve the Earth.

The issues surrounding abortion illustrate the difficulty in coming to terms with overpopulation. When abortion is discussed in developed countries, it is seen as an issue of individual choice, a matter of conscience and religious conviction. It is seldom discussed as a means of controlling human population. It is not that the other issues have no importance, they do. But to ignore the issue of population control when discussing abortion demonstrates that there is a long way to go before the denial of the problem fades, before humans can focus on the present and potential tragedy of continuing the status quo. It will be sometime before the dialogue shifts from individual choice to global necessity, if indeed humans are capable of such a radical cultural transformation.

Few want to diminish human liberty in order to achieve desirable ends. When education about social responsibility is only an afterthought in many cultures, there is little hope that humans will make the needs of posterity a serious part of their thinking—without some form of coercion or shock. It is human nature to wait until the child is run over before installing a traffic light, but in terms of global survival, such retroactive behaviour might prove to be fatal. Unfortunately, proactive people today are often seen as alarmists or fanatics.

Norms, or a *status quo*, related to environmental responsibility need to develop. Unfortunately, issues related to limiting population are seldom mentioned by parents, teachers, counsellors, or priests. Humans must recognize that the future of the human species itself is the issue. To secure a future, humans must restrain personal desires and breeding patterns *now*. Humans must examine and modify many, if not all, of the assumptions that currently form their most cherished personal beliefs. This requires more than a paradigm shift, it requires a revolutionary restructuring of thinking. If humans do not have the insight and courage to make the effort, the incalculable suffering of all Earth's creatures will be far greater than any conflicts that currently surround difficult ethical decisions. At that point nothing can be "protected" and the best conservation efforts of our time will collapse in the face of human needs. The word posterity needs to return to the human vocabulary.

REVERENCE FOR ALL LIFE

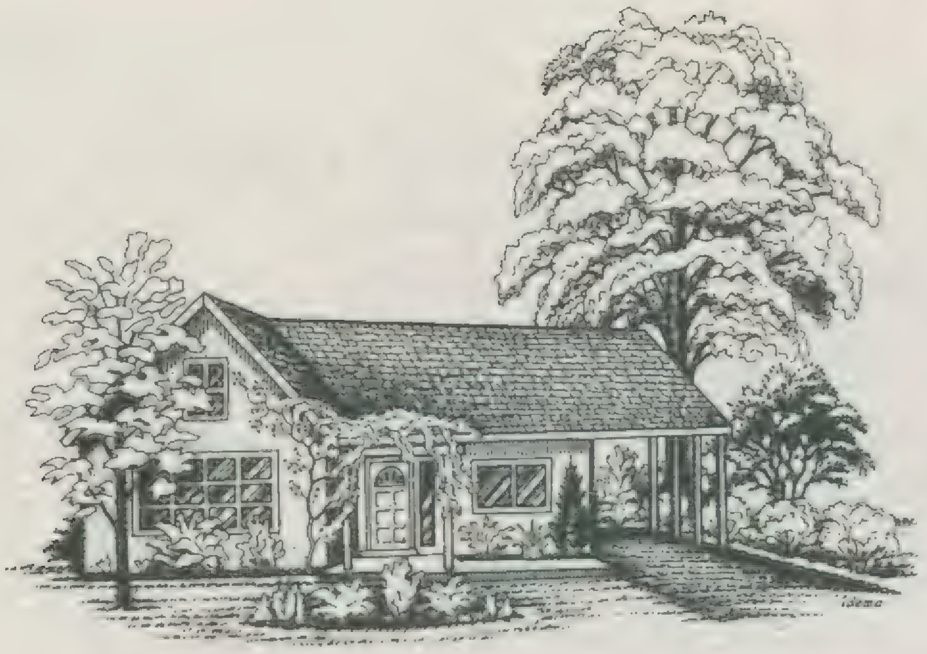
The 1993 river floods in the United States and Canada were reported as tragic events because of the immense human suffering that resulted. All of this was true enough, but few reports (Tenenbaum 1994) mentioned the other living beings that lost their lives and habitats and, in effect, shared in the tragedy. Nor did they mention the use of ecologically sustainable resource management as a means to prevent future such crises (McAllister and Topping 1993). No doubt the loss of trees, plants, and animals will eventually be reported but probably in terms of their economic loss to humans. Will they be considered as entities with intrinsic value in their own living natures or as creatures that managed to overcome impossible odds to be present today as products of 3.8 billion years of evolution?

Although there are signs that more people are taking into consideration the value of nonhuman life, there are still great attitudinal changes needed before wild animals and their habitats are given the respect required for their survival. Recently some logging companies and loggers in the Pacific Northwestern United States have expressed their willingness to cut every last tree and let everything that depends upon them die in order to maintain their short-term security. For some, this attitude persists even when the consequences for such actions are understood. They simply don't care.

What little consideration there is for animals is usually reserved for large mammals. The issue here is scale. If humans could see all of nature they would not need a telescope or microscope to explore the world. Because of the scale by which humans view the world, they value the large, highly visible animals while showing little regard for the small, often microscopic, creatures. Unfortunately, scale distorts and misinforms as to what is most valuable to a sustainable future. Humans spend much of their limited conservation resources on efforts to save the large, charismatic animals, not realizing they are less essential to a healthy planet than the smaller, often microscopic, undervalued ones that perform free services essential to healthy habitats. They also keep the Earth clean by breaking down animal and plant wastes into nontoxic, usable forms. Without them, all creatures would be living in their own waste and soon succumb. Despite this, humans work hard to save the elephant and pay little or no attention to the fungus that is about to go extinct. At a time when education is essential, it is seriously lacking.

Homo sapiens is unhealthily obsessed with itself to the detriment of the planet.

One has only to flick through several television channels at any time of the day or night to realize how focused *Homo sapiens* is on itself. Human problems predominate on the screen in programs dealing with everything from love relationships, weight loss, money making, and crime and war. There is hardly a thought given to the 27,000 living things that become extinct every year due to human activity. This obsession is unhealthy for it contributes to the factors that lead humans to deny the reality of their dependence upon nature. Many would laugh at the suggestion that humans should spend part of each day considering the miracle of nature's plants and creatures. But is this not the kind of exercise needed to help bring about the changes implied here? Indeed, weakening the assumptions that form the basis of anthropocentrism will bring humans several steps closer to those values useful for long-term survival.

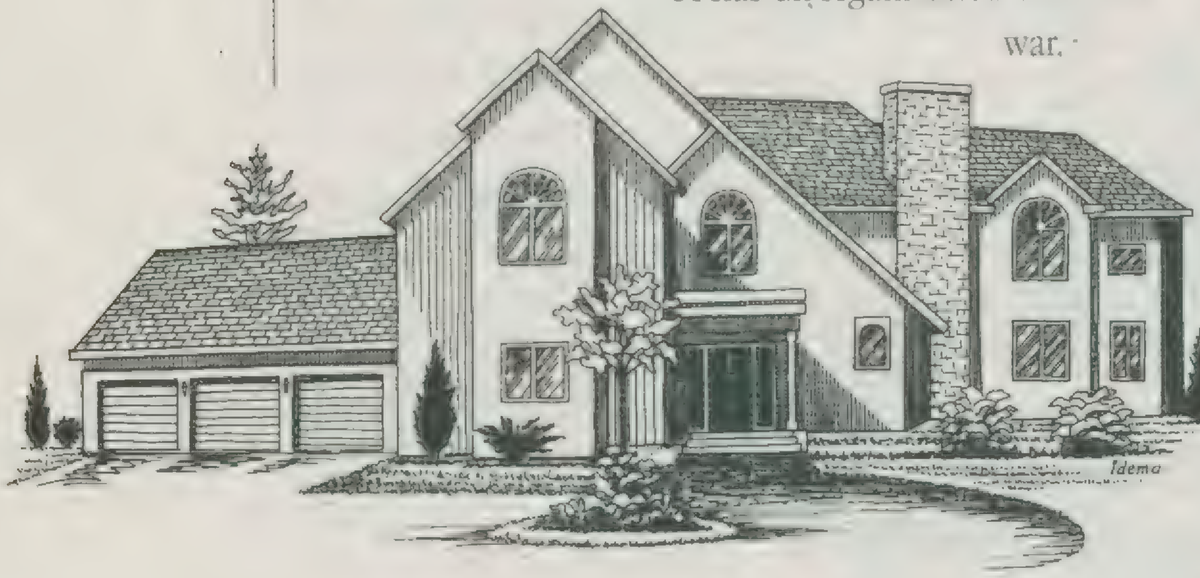


ECONOMIC GROWTH

Of all the values necessary for a sustainable future, those values associated with what constitutes a "quality" lifestyle need to be challenged and modified. Not only do humans need to reduce their population but also their standard of living to the extent that it includes excessive material consumption. Of necessity, humans will be weaned from some aspects of consumption as resources become scarce or nonexistent. If there can be a shift from thinking that the good life is based upon material things to the conviction that personal growth and integrity are far more important, the change might be less painful. As Eric Fromm suggested several years ago, humans need to give more thought to the consequences of choosing "having" over "being." Of course, human survival requires that basic needs are met, but when owning things smothers the potential for being a fully developed person, the loss is enormous.

Do humans love their children enough to change their habits of consumption?

The notion of less consumption flies in the face of conventional wisdom that economic growth is necessary for a sound economy. At some point, however, the ability of the Earth to provide all the resources required for this growth will come to an end. The likely consequence of not planning for downsizing human consumption will be social disorganization and civil war.



Somalia is only one well-publicized example of what can happen to a country when the resources can no longer sustain human population. Most people think that the problems in Somalia are political, when in reality they primarily result from having reached environmental limitations. As national institutions lose their effectiveness there is a greater reliance on tribal and family loyalties. If these fail, each individual must find a way to stay alive without community support. Natural forces will step in and reduce the population, in this case through starvation and violence. In fact, one can expect similar collapses of social order to occur in Africa and other areas as population increases and resources diminish. Continuing the ways of today will bring tragedy tomorrow. Do humans love their children enough to make the necessary changes?

ETHICAL CAPACITY

The capacity to be ethical sets humans apart from other living things. Since humans can understand the consequences of their behaviour, they have the ability to restrain negative behaviour in order to achieve positive ends. Often ethical behaviour comes in conflict with personal gain causing a serious tension when deciding upon action. Until recently, personal gain and greed have had the upper hand when it comes to environmental matters and still do most of the time.

On a recent radio talk show, a psychologist was talking with a woman who complained that she gave too much of her time to voluntary organizations. She wanted to spend more time with her new baby. The psychologist was quick to come to her support and said that she needed to learn to say no. Underneath was the implication that those who asked for her help considered her to be a sucker, an easy touch; the voluntary organizations were, in effect, using her. As is too common in such examples, the psychologist neglected to discuss the ethical consequences of the woman not fulfilling her commitments. Instead, the focus was on her stated need to have more time with her child. It was implied that the altruistic tendencies of the new mother were nothing more than a weakness, an inability to say no. The woman was advised to break her commitments, repress her instincts to be of service to the community, and focus exclusively on her child.

The example above is not atypical as western culture focuses on individual human wants with little or no regard for the place of humans within the web of nature.

When personal desires come in conflict with sacrifice for a better world, narcissism is the likely winner. There will always be conflicting feelings when making ethical decisions but the need to reconcile these feelings to the benefit of nature becomes more evident daily.

Because serving the needs of conservation will frequently come in conflict with personal gain, a dialogue on this issue is essential to understanding the reality and limitations of human nature. The way in which people go about strengthening positive values that support a healthy environment will be one of their greatest challenges.

CONCLUSION

All of this makes the future look dim indeed, and obviously, the securing of a viable environment will come as a result of radical cultural transformation. But does it have to be so painful? There is considerable evidence that people are willing to work for a sustainable environment. When friends and neighbours are committed to the task, the sacrifices do not register as being difficult. In fact, it becomes a joy to do positive work in such an atmosphere. If life-sustaining value shifts are combined with cultural support, environmentally sound behaviours can become the norm. How can this be done? Even if it can be done, is there time? These are among the most critical questions of our time, and within the next few decades, the answers will become clear. If humans don't begin making aggressive efforts to bring about these fundamental changes, the forces of nature will do it for them. In that case, the results are likely to be catastrophic.

SUGGESTED READING

Ehrlich, Paul & Ann. 1990. The population explosion. Simon and Schuster, New York. 320 pp.

Ehrlich, Paul & Ann. 1991. Healing the planet. Addison-Wesley.

McAllister, Don E. and Topping, Jane. 1993. Harmonizing water cycles: A two-billion-dollar flood prevention plan. *Global biodiversity* 3(3): 21-28.

Tennenbaum, David. 1994. Rethinking the river. *Nature Conservancy* 44 (4): 11-15.

Tudge, Colin. 1992. Last animals in the zoo. Oxford University Press. 266 pp.

Wilson, E.O. 1992. The diversity of life. Harvard University Press, Cambridge, Massachusetts. 424 pp.

Diverse quotations

- *Ecology is not only one of the matters of interest regarding the world, it is the central matter to which humanity has to pay attention.*

  Carlos Saul Menem
  President of the Republic of Argentina
  17 January 1994, to the IUCN General Assembly

- *The universe requires an eternity. Thus they say that the conservation of this world is a perpetual conservation and that the verbs, "conserve" and "create", so much at odds here, are synonymous in heaven.*

  Jorge Luis Boreges, writer from Argentina,
  Historia de la Eternidad

- *The only way to save our environment is to adapt the nature of our activities (and the number of our species) to the carrying capacity of our planet. For this, what we need least is an increase in national income.*

  Roefie Hueting, Dutch economist, 1991. Central Bureau of Statistics, *Save the Earth.*

- *All terrestrial life ultimately depends on soil and water. So commonplace and seemingly abundant are these elements that we tend to treat them contemptuously.*

  Daniel J. Hillel, 1991. *Out of the Earth.*

- *Transnational agribusinesses: My personal boredom with the subject notwithstanding, it's worth repeating that TNCs (transnational corporations) are not around to provide food and employment but to make profits, full stop.*

  Susan George, 1990. *Ill fares the land.*

- *The most important fact about Spaceship Earth: An instruction book didn't come with it.*

  R. Buckminister Fuller

Biodiversity news

CSZ compiles valuable data base of Canadian zoological collections

The Zoological Collections Advisory Committee of the Canadian Society of Zoology (CSZ) has compiled a data base on over 150 zoological collections in Canada, other than those of terrestrial arthropods, a vital bank of Canada's natural heritage. The data base is available through the Canadian Heritage Information Network and provides names, addresses, telephone numbers, contacts, details on the collections, accessibility to researchers, current research topics, eventual fate of the collections, and types of collections welcomed by the owner for deposit. Where confidentiality was requested by the source, all or part of the record is unavailable.

The data base is accessible for searches and subscriptions. Persons desiring a printout, a diskette, or a subscription information kit should contact:

Client Services
Canadian Heritage Information Network
Department of Canadian Heritage
365 Laurier Avenue West
Ottawa, Ontario K1A 0C8, Canada

Telephone: (613) 992-3333
Fax: (613) 952-2318
E-mail: (Express): CAN~SERVICE
(Internet): Service @ Calvin.CHIN.DOC.CA

Persons wishing to add information to the data base should contact:

Chair, CSZ Zoological Collections Advisory Committee
c/o Biological Survey of Canada (Terrestrial Arthropods)
Canadian Museum of Nature
P.O. Box 3443, Station D
Ottawa, Ontario K1P 6P4, Canada

Individuals can send requests to the CSZ for help in finding repositories for specimens at the same address. The CSZ cannot itself accept collections but the permanent Advisory Committee will provide advice on disposition of collections and, where possible, facilitate deposition in an appropriate institution.

photo by Noel Alfonso

U.S. Biological Survey and Museums Sign Agreement

On 24 February 1994 United States Interior Secretary Bruce Babbit signed an agreement of understanding with the Association of Systematics Collections (ASC) to provide a framework for future cooperative activities with the National Biological Survey (NBS), a new bureau at the Department of the Interior.

"This cooperative agreement is a milestone — bringing the substantial resources of our Nation's museums and botanical gardens into partnership with the National Biological Survey," Babbit said. "The support of these scientists and their collective information on America's biological resources will be tremendously helpful to the NBS."

Philip Humphrey, President of ASC, said, "This agreement recognizes the shared goals of the NBS and the nation's natural history institutions. We are pleased that the institutions housing biological collections throughout the country can provide reliable data, scientific expertise, and through our exhibits and public programs, can serve as windows on biological survey activities for the American people."

The agreement recognizes common interests in four areas: biological collections resources, scientific expertise in taxonomy and related sciences, biodiversity information, and education. Under the agreement, a working group will be formed to explore such issues as the role of natural history institutions in the storage and use of voucher specimens, which support the work of the Survey, and the methods of exchanging specimen-based data and other scientific information between the nation's biological research collections and the NBS. It will identify the breadth of scientific talent for the important taxonomic work that underlies any biological survey. Other areas of cooperation may be addressed in the future.

The NBS became operational on 11 November 1993 to gather, analyze, and disseminate the biological information necessary for the sound stewardship of American natural resources, and to foster understanding of biological systems and the benefits they provide to society. The NBS will perform research in support of biological resources management; inventory, monitor, and report on the status and trends of the nation's biotic resources; and develop the ability and resources to transfer information gained in research and monitoring to resource managers and to others concerned with the care, use, and conservation of the American natural resources.

ASC is an international not-for-profit organization devoted to the support of institutions housing biological collections used in research. ASC promotes the use of collection resources for the betterment of society. ASC represents freestanding museums, botanic gardens, universities, state museums, state biological surveys, and federal and state agencies housing collections. In 1982 the ASC was the first scientific society to pass a resolution in support of a U.S. National Biological Survey.

Exploring ecosystem-based forestry in Russia and Canada

Directors of the Silva Forest Foundation, based in British Columbia, Canada, were part of a technical team investigating the feasibility of community-based, sustainable forestry projects in the Russian Far East and central Siberia. The team was supported by the Pacific Environment and Resources Centre (PERC) in Sausalito, California.

The concepts of ecosystem-based planning were enthusiastically received by the Russians working to protect Siberian tiger habitat in the Russian Far East and by a collective of scientists in Krasnoyarsk in Siberia. In July 1993 the scientific collective in Krasnoyarsk had been granted a 60,000 hectare reserve on which to implement ecosystem-based planning and operations. Inventory data is already being collated and mapped. In May 1994 the Silva Forest Foundation hosted six scientists and foresters from Russia in order to show them in more detail how ecosystem-based planning takes place.

The Silva Forest Foundation is also working with environmental groups in the Slocan Valley of southeastern British Columbia through the CORE (Commission on Resources and Environment) process to develop and test a model for ecosystem-based planning. The project will apply concepts of landscape ecology and conservation biology to an ecological and economic analysis of the Slocan Valley. The results will establish a protected landscape network across the forest landscape, develop local standards for ecologically responsible forest use, provide a sustainable economic blueprint for the watershed, and provide a computer-based model for ecosystem-based planning. These will be made available to other groups and communities. The Bullitt Foundation and the West Coast Environmental Law society have generously funded the Slocan Valley project. [*Silva Forest Foundation Newsletter* Spring 1994].

U.B.C. establishes post for First Nations Forest Resources Management Coordinator

A First Nations Forest Resources Management Coordinator position has been established at the Faculty of Forestry, University of British Columbia (U.B.C.) in Vancouver. Funded by the Vancouver Foundation and the B.C. Ministry of Forests for a three-year period, this is the first such position in Canada and probably in North America. The coordinator will develop and implement a program of awareness and recruitment designed to help First Nations students enter forestry programs at U.B.C. and at other post-secondary education institutions in the province.

Five years ago there were no First Nations students enroled in the faculty, although Dave Walkem, currently Chief of the Cook's Ferry Band near Merritt, British Columbia, graduated in 1979. This year, four First Nations students were enroled in the Forest Resources Management degree program and one is enroled in the Natural Resources Conservation program. This new position will assist interested students in preparing for and entering natural resources management. For more information phone Donna Goss, Coordinator of Student Services at the Faculty of Forestry at (604) 822-2727. [*U.B.C. Chronicle*, Spring 1994, 48(1): 10].

Support for research is weak in Canada

Amongst developed countries, Canada occupies the second last place in the financing of research. Per capita, measured in U.S. dollars, monies allocated to research and development in 1991 were $581 in Sweden and Japan, $441 in France, $280 in Canada, and $191 in Australia. In number of scientific publications per year, Canada ranks seventh among G7 states. These facts show that Canada continues to be a branch-plant economy in which multinational corporations spend most of their research funds in their head-office country. One hopeful sign is the amount funded by the private sector is growing—at least in Quebec. But it is clear that Canada has far to go in catching up in supporting research on biodiversity and other areas. [*Le Devoir*, 7 May 1994, p. E4].

Photo courtesy of The Ottawa Citizen

Preparation of Canadian Biodiversity: A guide to current botanical specialists and literature is underway

Preparation of this publication, which will give complete literature citations to all or most publications of selected Canadian botanists, was initiated a year ago. Publications listed are restricted to works on—or at least, indirectly related to—vascular plants and bryophytes. The publications must also deal with any aspect of biodiversity in the broadest sense, particularly ecology, environmental studies, systematics, phytogeography, and germplasm variation of both wild and cultivated plants. Also, included are unpublished reports, especially of biological consultants, provided that they are deposited in libraries, and therefore, readily available. To date, about 250 invitations have been issued to Canadian scientists and bio-consultants, and about 100 bibliographies (ca. 300 pages) have been completed. This reference guide should serve to prevent duplication of effort, stimulate cooperation with available experts, and identify strengths and weaknesses of biodiversity research in Canada.

If any of your publications seem relevant, and you have not yet received an invitation to contribute your bibliography, please contact:

Ernie Small or Jacques Cayouette
William Saunders Building, C.L.B.R.R., C.E.F.,
Agriculture and Agri-Food Canada
Ottawa, Ontario, K1A OC6
Telephone: (613) 996-1665
Fax: (613) 943-0953 E-mail: SMALLE@NCCCOT2.AGR.CA

Biodiversity manual for overseas field workers is underway

The Royal Geographical Society has won a contract from the British Department of the Environment to produce a manual for biodiversity assessment for use by overseas field workers. Produced under the auspices of the Darwin Initiative, the manual will be fully illustrated, practical, instructive, and aimed at those of varying skills and experience. Publication is planned for Spring 1995.

The manual will be prepared using expertise drawn from within the Royal Geographical Society and colleagues from the Natural History Museum and the Royal Botanic Gardens at Kew and Edinburgh. [*The Newsletter of the Royal Geographical Society*, December 1993, p. 1].

Eco-Emballages in France—Collection and processing of packaging legislation goes into effect

The Lalonde Decree of 1 April 1992 establishes that every manufacturer, importer, or marketer of packed consumer articles is obliged to contribute financially to the collection and processing of its packaging. The Decree entered into force 1 January 1993.

The program has started with about 40 pilot sites or municipalities that will be supported in the collection and disposal of waste material. About 2,400 contracts have been concluded and were worth about 270 million francs in 1993, a figure expected to rise to 400 million francs in 1994. The Direction Générale de la Concurrence, de la Consommation et de la Réduction des Fraudes will initially send a warning letter to all manufacturers that do not carry a Point Vert logo on the packaging. Non-compliance will garner fines from 2,000 to 50,000 francs and fines from 6,000 to 12,000 francs for printing the Point Vert logo without having paid the appropriate contribution. In serious cases imprisonment can be imposed. [*Pets Europe*, 1994, 6(2): 31].

This French legislation and earlier German laws set models that could have been followed in the NAFTA free trade agreement. NAFTA could still be "greened" by the addition of similar suitable or enhanced protocols. [D.E.M.]

California goes organic

The "big names" or large corporations in California agriculture, fount of much of the continent's vegetables and fruits, are switching to more earth-friendly methods of growing crops. The corporations include Gallo, Dole, and Paramount. Dole is raising insects for biological control of pests. Paramount, a major citrus grower, has switched one-third of its 10,000 acres to sustainable systems, devotes 280 acres to certified organic oranges, and releases up to 150,000 predatory wasps per acre. Pandol and Sons of Delano, California, one of the biggest suppliers of table grapes in the state, have reduced chemical use by 70 percent and replaced synthetic fertilizers with manure-based compost. [*Organic Gardening*, January 1994, 41(1): 18-19].

This move by major producers in one of agriculture's most important states is setting a new standard that competitors will have to match or lose market shares. With about 0.5 billion kg of pesticide use per year in the United States (fairly stable over the last 15 years) or about 1.8 kg of pesticide per person, this change bodes well for people and the environment. In Canada a total of 27,544,000 kg of herbicides and insecticides were used in 1987 (*The State of Canada's Environment*, 1991), for an annual per capita use of 1.1 kg. Canada's use per capita was thus 61% of the current usage in the U.S., but usage per capita has probably increased since 1987. It is unclear whether the Canadian figure includes all pesticides, such as fungicides. [D.E.M.]

The Entomofauna of Quebec Project carries on

The Entomofaune du Québec project is in its eighth year. The project is aimed at correcting the absence of relevant works in the French language available to those who wish to study the insects of Quebec. The objective is to inventory the species of insects and related groups that are present in Quebec through a supportive and stimulating operation, which will survey and compile data, and permit taxonomic and faunistic knowledge to be assembled and developed. A management group under the auspices of the Entomological Society of Quebec has developed the details of the system, which requires collaborators, computer equipment, and funds (currently limited), for the support of the operation.

Potential participants in the project can register by completing a form. The documents are available at minimal cost to cover packing and mailing expenses. The microcomputer resources are based at Chicoutimi with the project Director, Dr. André Francoeur, and the Secretary Treasurer, Mr. Robert Loiselle.

The entomofauna system has three elements: specialized publications such as guides, entomological texts, and an electronic data bank under development for faunistic data.

An excellent publication, "Le Bulletin de l'entomofaune" is the official publication of Entomofaune du Québec and can be subscribed to for a minimal fee by writing:

Entomofaune du Québec Inc.
Laboratoire de biosystématique
Université du Québec à Chicoutimi
555, boulevard de l'Université
Chicoutimi, Québec G7H 2B1
Tel. (418) 545-5011.

IJC releases report on water quality in the Great Lakes

The International Joint Commission (IJC) has just released its *Seventh Biennial Report on Great Lakes Water Quality.* The introduction states that, "The theme of this report is that the time has arrived for a major shift in the way decision-making takes place for the Great Lakes ecosystem. In particular, society must adopt a clear and comprehensive action plan to virtually eliminate persistent toxic substances that are threatening human health and the future of the Great Lakes ecosystem. A consensus-building process is needed that will allow all sectors of society (including governments, business corporations and associations, labour unions, and professional, consumer, and other organizations) to join in making the decisions to effect the required economic and social transition."

The report covers what is happening to the Great Lakes basin and its inhabitants, strategic thinking about the problem, and the need for further change. Frameworks for strategic action, ideas on reaching consensus to effect change, a specific strategy to eliminate persistent toxic substances, and ecological approaches in remedial action plans, research, science, and data needs are all discussed ending with conclusions and recommendations. Amongst other recommendations are:

- Governments adopt a specific, coordinated bi-national strategy within two years with a common set of objectives and procedures for action to stop the input of persistent toxic substances into the Great Lakes environment, using the framework developed by the Virtual Elimination Task Force.
- Governments adopt a specific timetable for virtual elimination of persistent toxic substances in the Lake Superior basin as part of their pilot project for zero discharge and virtual elimination, and publish an initial biennial State of Lake Superior Basin report, including specific indicators of progress not later that 31 December 1994.
- Governments continue to develop and support environmental curricula at all levels of education as a fundamental component in a new way of thinking.
- Senior government officials allow Remedial Action Plans (RAPs) to be led by the community rather than dominated by regulatory agencies. To be successful, RAPs must integrate the efforts of all agencies, stakeholders, and concerned community members towards restoration of beneficial uses within a comprehensive ecosystem approach.
- Governments improve the understanding of groundwater pollution and its impact on the Great Lakes, and act to eliminate its causes.

There are 22 recommendations in all. As a whole, the recommendations are forward-looking, based on sound scientific knowledge and are well thought out. This gives one hope for the future of the Great Lakes. The place of biodiversity *per se* does not seem to be recognized and the role of environmental organizations in education, public awareness, and understanding seems to be downplayed.

The health of the Great Lakes involves the collaboration of both Canada and the United States.

The report also asks good questions on the implications of inaction. For example:

- What if, as current research suggests, the startling decrease in sperm count and the alarming increase in the incidence of male genital tract disorders are, in fact, caused in part as a result of *in utero* exposure to elevated levels of environmental estrogens?
- What if, as current research suggests, the epidemic in breast cancer is a result in part of the great numbers and quantities of estrogen-like compounds that have been and are being released into the environment?
- What if the documented declining learning performance and increasing incidence of problem behaviour in school children are not functions of the educational system? What if they are the result of exposure to developmental toxicants that have been and are being released into the children's and parent's environment, or to which they have been exposed *in utero*?

Copies of the 58-page report can be obtained from IJC offices at 1250 23rd Street N.W., Suite 100, Washington, D.C., U.S.A. 20440 or 100 Metcalfe Street, 18th floor, Ottawa, Ontario K1P 5M1, Canada.

Tea tree oil forms basis for new pet care product

A new skin care ingredient for pets has been found in Tea Tree Oil or Melaleuca Oil. The oil is steam-distilled from the leaves and terminal branches of *Melaleuca alternifolia* and *M. linariifolia*, which are found in swamps and on riverbanks in New South Wales, Australia. Because of the tree's capacity to rejuvenate, the trees coppice and can be harvested at intervals of 12 to 18 months. The oil has been used by Aboriginal and European Australians as a reliable natural cure for cuts, abrasions, wounds, insect bites, sunburn, mouth ulcers, itchy scalp, and with some people, even psoriasis and herpes.

Dogs and cats are prone to a number of skin conditions. They especially require non-toxic skin ointments because they frequently lick afflicted areas. The anti-fungal and anti-bacterial qualities of tea tree oil are enhanced by its soothing, non-irritant, and non-toxic qualities. It has proven useful in cats and dogs for bacterial dermatitis, inflammatory seborrhoea, "hot spots," scaling pyodermas, itching, and fungal infections of the skin. [*Pets Europe* 1994, 6(2): 37].

The Melaleucas belong in the Myrtle family, the same family in which Eucalyptus trees are placed. Another species, the prickly-leaved paper-bark tree, *M. styphelioides*, of New South Wales and Queensland, grows in saline wet soils. Its wood resists attacks by teredo worms and so is used for marine woodwork [T.H. Everett. 1967. *Living trees of the world.* Thames and Hudson, London. 315 pp.].

Request for scientific literature for Cuba

The Association of Systematics Collections (ASC) is developing a program to exchange systematics and biodiversity information between North American and Cuban institutions. If you are willing to donate books, journals, or reports in systematics/biodiversity (especially related to Caribbean biota), please contact the ASC office. ASC will arrange to ship the materials to an appropriate institution in Cuba. For more information and to contribute contact: Elizabeth Hathway, ASC, 730 11th Street, NW, Second Floor, Washington, D.C., U.S.A. 20001-4521, telephone (202) 347-2850,
fax: (202) 347-0072.

Farewell and Thanks to the Jarzens

For several years, David and Susan Jarzen have given their time, energy, and skills of efficiency to *Global biodiversity* by carrying out the duties of *Book Review Editor.* Due to ongoing research projects, they stepped down from the post on 1 July 1994. *Global biodiversity* salutes their contributions and wishes them well in their future endeavours.

Global biodiversity is pleased to announce that Patrick Colgan, Executive Vice-President of the Canadian Museum of Nature, has agreed to take on the task (and joy) of Book Review Editor. Needless to say, the publication is always on the lookout for both new reviewers or the latest material in the biodiversity field. If YOU are interested in reviewing a book, conference proceedings, publication, or CD-ROM – or you have an idea for what should be reviewed – please contact Patrick Colgan at the address on the inside front cover.

Biodiversity Meetings

18-22 SEPTEMBER 1994

1994 AZA (Aquarium and Zoo Association) Annual Conference, to be held in Atlanta, Georgia, U.S.A.

Contact:

Paul Grayson
Conference Program Chairperson
Indianapolis Zoo Tel: (317) 630-2054

20-23 SEPTEMBER 1994

Coastal Zone Canada, to be held in Halifax, Nova Scotia, Canada.

Contact:

Patricia Lindley
Ocean Studies, Office of Research Services
Dalhousie University
Halifax, NS B3H 4H6
Tel: (902) 494-1462 Fax: (902) 494-1595

27-28 SEPTEMBER 1994

Boreal Forests and Global Change: 4th Annual Meeting of the International Boreal Forest Research Association, to be held in Saskatoon, Saskatchewan.

Contact:

M. Apps (Co-Chair)
Canadian Forest Service, Northern Forestry Centre
5320-122 St.
Edmonton, AB T6H 3S5
Fax: (403) 435-7359 E-mail: mapps@nofc.forestry.ca

24-28 OCTOBER 1994

Down to Earth: Practical Applications of Ecological Economics - An International Transdisciplinary Conference, to be held in San José, Costa Rica

Contact:

International Conference of Ecological Economics
P.O. Box 555
3000 Heredia
Costa Rica

26-28 OCTOBER 1994

State of the Lakes Ecosystem Conference, to be held in Dearborn, Michigan.

Contact:

Philip Hoffman
U.S. Environmental Protection Agency
Great Lakes National Program Office
77 W. Jackson Blvd.
Chicago, IL 60604
Tel: (312) 886-7478 Fax: (312) 353-1155

7-10 NOVEMBER 1994

World Congress - Ecotourism, to be held in Tasmania, Australia.

Contact:

The Adventure Travel Society, Inc.
6551 S. Revere Parkway, Suite 160
Englewood, CO 80111 USA
Tel: (303) 649-9016 Fax: (303) 649-9017

7-11 NOVEMBER 1994

Evolutionary and Ecological Processes Underlying Biodiversity, to be held in Aussois, France.

Contact:

Mrs. Dominique Lidoreau
CNRS, Conferences Jaques Monod
Bâtiment 5, Avenue de la Terrasse
91198 Gif-sur-Yvette Cedex France

7-18 NOVEMBER 1994

Ninth Meeting of the Parties to CITES, to be held in Fort Lauderdale, Florida, USA.

Contact:

CITES Secretariat
United Nations Environment Programme
Case postale 456, CH-1219 Châtelaine,
Geneva Switzerland
Tel: (41-22) 979 9111 Fax: (41-22) 797 3417

10-13 NOVEMBER 1994

Forest Canopies - Ecology, Biodiversity and Conservation, to be held in Sarasota, Florida, U.S.A.

Contact:

Meg Lowman, Director of Research
Selby Botanical Gardens
811 South Palm Ave.
Sarasota, Florida 34236 U.S.A.

17-21 NOVEMBER 1994

Fourth International Congress of Ethnobiology: Ethnobiology in Human Welfare, to be held in Lucknow, India.

Contact:

S.K. Jain
Chair, Organizing Committee, 4th ICE
National Botanical Research Institute
Lucknow, India 226001.
Tel: 91-236432 Fax: 522-244330, 243111

or:

International Society of Ethnobiology
803 Craft Avenue.
Elcerrito. CA. USA.

18-19 NOVEMBER 1994

Biodiversity from 1986 to the 21st Century - an inaugural symposium of the Consortium for Systematics and Biodiversity, to be held in Washington, D.C.

Contact:

Dr. Marjorie Reaka-Kudla
Department of Zoology
University of Maryland
College Park, Maryland 20742
U.S.A. Tel: (301) 405-6944

28 NOVEMBER - 9 DECEMBER 1994

Meeting of Conference of Parties to the Convention on Biological Diversity, to be held in Nassau, the Bahamas.

Contact:

Angela Cropper, Excecutive Secretary
Convention on Biological Diversity
United Nations Environment Programme
15 chemin des Anemones, CP356
CH-1219 Chatelaine
Geneva, Switzerland
Tel: 41 22 797-9111 Fax: 41 22 797-2512

DEC 7-8 1994

Discussion Meeting on New Uses for New Phylogenies, to be held in London, UK.

Contact:

The Scientific Meeting Secretary
The Royal Society
6 Carleton House Terrace
London, UK SW15 2Nu

DEC 14-17 1994

International Symposium on Plant Molecular Biology and Biotechnology, to be held in New Delhi, India.

Contact:

Mr. G. Chatterjee
ICGEB, NII Campus
Aruna Asaf Ali Marg
New Delhi, 110067 India
Tel: 91-11-6867356 Fax: 91-11-2316

29 DEC 1994 - 5 JAN 1995

Second World Congress on Herpetology, to be held in Adelaide, Australia.

Contact:

Michael J. Tyler
The University of Adelaide
Department of Zoology
Box 498 GPO
Adelaide 5001, South Australia

Book and Periodical Niche

A synonymized checklist of the vascular flora of the United States, Canada, and Greenland

By John T. Kartesz. 1994. Second revised edition. Volume 1: Checklist, pp. 1-622. Volume 2: Thesaurus, pp. 1-816. Timber Press, Portland, Oregon, U.S.A. 97225. Hard cover, ISBN 0-88192-240-8. US$159.

Monumental is the only word to describe this checklist of the vascular flora of North America north of Mexico. It is a greatly revised and augmented version of the 1980 checklist that John Kartesz wrote in collaboration with his

sister, Rosemarie Kartesz. This second edition, containing one third more names than the first, includes the names of 3,164 genera, 21,757 species, 8,872 infraspecific names (or names below the species level), and their synonyms. One may not agree, in every instance, with the taxonomy adopted by Kartesz, but one must admire his energy and the thoroughness and comprehensiveness of these volumes.

The checklist covers the vascular flora of the continental United States, Canada, St. Pierre and Miquelon, Greenland, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Although some 350,000 names were considered, for most groups, the synonymy is at the functional or "manual level." There is still scope left for the monographer. Started in 1973, the checklist was based on a review of botanical literature since 1900, including regional floras, state floras, botanical journals, monographs, the Gray Herbarium Index, and conservation literature.

Draft treatments of the families and genera were sent to numerous taxonomists, and comments were received from more than 500 reviewers and cooperating specialists. During the course of the study the author personally examined about 1.2 million specimens.

A major problem with the first edition was finding what had become of synonymous names. This was especially serious in large genera such as *Carex* or when segregate genera were involved. This problem is completely solved by the publication of Volume 2 or the thesaurus. All names in the checklist, accepted names, and synonyms alike are included, and if they are synonyms, their equivalency is given.

One should not underestimate the magnitude and significance of this undertaking. This is not merely a compilation of names. It required reasoned taxonomic judgment to sort through conflicting taxonomies, the diligence of a detective to track down obscure names and their documentation, and the exercise of legal perspicacity to conform to the ever changing International Code of Botanical Nomenclature. If this was the end of the project, the author could be satisfied with a job well done; but the checklist is only the start. It is already being used by the author as the foundation of a relational data base that includes vernacular names, geographical ranges (state/province), and biological and morphological characters.

The checklist will have many uses: It will be a standard nomenclatural reference for taxonomists, ecologists, and students of biodiversity; a reference to nomenclatural equivalency; and a source of names that need to be accounted for by authors of floristic treatments. It would be very useful if the two volumes were available in electronic form (CD-ROM) but in the meantime, I highly recommend this two-volume checklist to anyone who uses botanical scientific nomenclature.

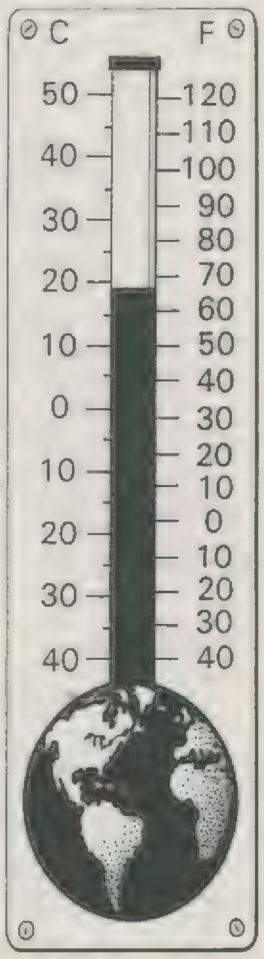
George W. Argus, Botany, Canadian Museum of Nature

Global warming and biological diversity

Edited by Robert L. Peters and Thomas E. Lovejoy. 1992. Yale University Press, New Haven and London, 386 pp, U.S.$45.00, ISBN 0-300-05056-9.

More than anything, the sceptre of global warming promises to deliver the final blow to much of the Earth's already heavily fragmented and polluted biodiversity. This book, divided into five parts, successfully draws together what is currently projected for wild species in a greenhouse world. Part One contains the introduction and some general overviews, and Part Two outlines past faunal and floral responses to climate change as seen in the fossil record. Part Three contains reviews of specific ecological and physiological responses, including those of coastal marine zones, soils, tropical forests, plants, animals, diseases, and parasites. The specific regions and sites covered in Part Four include arctic marine, arctic tundra, temperate forests, and Mediterranean-type ecosystems. Part Five discusses the implications of global warming for biological conservation. In all, there are 26 chapters with a wealth of well-referenced information.

I recommend the book to anyone with an interest in the future of the planet for several reasons. First, it is the first synthesis of this type that I am aware of. Second, the book is generally well



organized, although some chapters may have been better placed elsewhere. Third, it provides a good overview of the current literature. Last, the book is very timely. Many people think that a greenhouse world is so far off that it is not of concern to them today. However, a recent report in *Science* (1994, 263: 954-958) should cause alarm bells to start ringing. It shows that tree mortality and recruitment in tropical forests has increased since the 1950s, with an acceleration since 1980. The likely culprit, it turns out, could be global warming. If the increased turnover of individuals leads to the increased turnover of species, then we might expect a resulting decrease in species diversity. The first biological effects of global warming may well be with us now. As this book shows, however, the final effects will likely be with us forever.

Dr. Paul C. James, Royal Saskatchewan Museum, Regina, Saskatchewan, Canada.

Breaking the logjam: Obstacles to forest policy reform in Indonesia and the United States.

By Charles Victor Barber, Nels C. Johnson, and Emmy Hafild. 1994. World Resources Institute (WRI), 1709 New York Avenue, N.W., Washington, D.C., U.S.A. 20006. 120 pp. Large-format paperback. ISBN 0-915825, US$14.95.

Despite increased efforts to stem deforestation, recent reports indicate that tropical forests throughout the world are continuing to vanish at alarming rates. Focusing on Indonesia and the Pacfic Northwest of U.S.A., *Breaking the logjam* examines the underlying economic, social, and political forces that drive forest conversion and exploitation in both tropical and temperate regions. The authors identify three sets of issues essential to more sustainable forest management and use, and suggest ways in which local participation, national institutions, donor assistance, and international action can promote effective forest management. [W.R.I.]

Evaluating the carbon sequestration benefits of forestry projects in developing countries

By Paul Faeth, Cheryl Cort and Robert Livernash. 1994. WRI, 1709 New York Avenue, N.W., Washington, D.C., U.S.A. 20006. 96 pp. Large-format paperback. ISBN 0-915825-95-3. U.S.$14.95.

Although the basic theory of carbon-offset forestry, in which trees are used to absorb and bank carbon dioxide emissions from burning coal and petroleum products, is relatively straightforward, devising a way to evaluate the carbon sequestration potential of particular forestry projects is much more complicated. This report presents a unique methodology for testing and comparing the carbon-offset potentials of a broad range of forestry schemes, using a dynamic land-use model developed by the World Resources Institute. The authors provide important insights and practical guidance for policy-makers, utility executives, project planners, and anyone else interested in the possibility of offsetting carbon dioxide emissions through sustainable forestry and land-use projects. [W.R.I.]

Maurice Strong, who was the Secretary General of the Earth Summit and now is president of Ontario Hydro, has been harshly criticized for proposing the planting of trees in Costa Rica to offset coal-powered generating plants in Ontario. This report shows that there is a sound foundation for his proposal. In addition, if multi-species indigenous trees were planted there, habitat would be restored to bring back Costa Rica's rich terrestrial biological diversity. Finally, Strong's proposal promotes the concept of treating the planet as an integral ecosphere instead of disconnected provinces and nations. Surely this is a desirable step forward in creating worthy North-South partnerships. [D.E.M.]

The Global Environment Facility and biodiversity conservation: Lessons to date and suggestions for future action.

By R.A. Mittermeier and I.A. Bowles. 1993. *Biodiversity and Conservation* 2: 637-655.

The last five years, in particular, have seen increasing attention paid to biodiversity. This culminated in the Earth Summit in June 1992 with the completion of Agenda 21 and a major international agreement, the Convention on Biological Diversity, a document signed by some 165 nations. Concurrent with the Convention negotiations, a global fund for biodiversity conservation and other environmental priorities, the Global Environment Facility (GEF), was developed. Although the GEF is the largest fund to date put forward by the international community to address biodiversity loss, it has failed so far to set adequate priorities for biological conservation. It has yet to recognize the full range of biodiversity values and uses, and in general, GEF projects have not taken advantage of existing non-governmental capacity for biodiversity conservation. 1993 was a critical year for the GEF. Will the GEF become a critical element of global efforts to conserve biodiversity, or will it remain an important initiative that realized only a fraction of its potential. [Authors' abstract].

Il était une fois la vie...Le spectacle inachevé

By Jean-Guy Lavoie. 1991. Institut pour la Recherche et l'Éducation en matière de Conservation, Ste-Foy, Québec. 154 pp. ISBN 2-9802187-0-7.

Like a play dedicated to our planet, this book begins with a prologue, followed immediately by an entrance where the author explains in simple yet well chosen terms the basic phenomena governing the biosphere. He carries on with his three-act story by establishing in the first act where we as the actors fit as an integral part of our environment along with its plants and other animals. In the second act he then talks about reproduction as a crucial element of survival on Earth, about the changes that dictate the continuous adjustments in all living organisms and the migration of animal populations. The third and final act focuses on the extinction of plant and animal species, the precariousness of the health of our planet and the light at the end of the tunnel, which will one day allow us, as we all hope, to better protect our natural heritage vital to life on Earth. The epilogue invites us to reflect on ourselves as we are the one and only culprit of all the changes over the centuries that have shaped our environment to make it what it is today.

One should read this book very closely as it explains several important life principles governing the ecosystems that, in the end, make up the biosphere where we live so selfishly. It is very well written and includes well chosen and easy to understand examples. It will interest everybody who is concerned about the problems of conservation on Earth, from the specialist to the layman. The author's vision is up to date and could eventually move a certain number of readers to action. Who knows? He would then have reached his goal...the unfinished show since in which as long as there is life, there is hope.

Dr. Michel Poulin, Research Division, Canadian Museum of Nature

Gestion et validation des données d'échantillonnage à l'aide de la BADIQ

By André Francoeur. 1993. Patrimoines Naturels Collection, vol. 13, Patrimoine Écologique Series, Musée d'Histoire Naturelle, Paris. pp. 18-27.

For governments and a certain part of the public, the biodiversity of our environment has become a resource to be conserved; it is even considered essential. An inventory of this biodiversity has been carried out by biologists—in particular, by taxonomists—for more than 150 years and sampling data will keep on accumulating in the future. But over time, these can undergo several changes: the actual material changes in the case of specimens, and the type of data changes—documentary, taxonomic, toponymic, and contextual. The author presents the general characteristics of the relational data base on Québec invertebrates (BADIQ). In the course of developing the data bse, it was necessary to deal with this problem of "change" in an integrated way. In order to validate and store the data concerning each sample, these changes had to be more tightly controlled to allow more meaningful and realistic analyses to be performed on the state of the environment at a given time. This approach allows not only the retrieval of past information with more certainty, in order to correct it and even complete it, but also guarantees that new data is better dealt with. In this way biodiversity is managed in a scientific and dynamic way. [Author's Summary]

Energy ideas *and* Forty ways to make government purchasing green

The Center for Study of Responsive Law, Government Purchasing Project, P.O. Box 19367, Washington, D.C. 20036

The Center for Study of Responsive Law is a non-profit research and educational organization in the United States and was established by Ralph Nader in 1968. Recently, a monthly newsletter, *Energy ideas* was initiated and discusses how government can be an environmentally responsible consumer using energy-efficient and renewable energy technologies. Each issue examines a different technology and is solely dedicated to it. For instance, Volume 1, Number 1, published in July 1992, was on "Lighting"; Volume 1, Number 9, published in March 1993, concentrated on "Athletic Facilities." For the small fee of $25US per year, one can learn of projects successfully organized by federal, state, and local agencies and receive advice on contact persons, financing options, and other information sources.

A second publication, *Forty ways to make government purchasing green*, is also available at the low cost of $10US per copy. Its purpose is to provide a resource for government energy managers and policy makers. The ideas therein could effectively be implemented by most purchasing officials in local business as well as government. This booklet lists successful activities, information, and guides for establishing environmentally responsible programs that use energy-efficient technologies. For example, Columbus, Ohio, buys recycled aluminum street signs and is reusing them. Thus they save money twice, once when a sign made from recycled material is bought, and second, when it is reused (p. 16). Another simple idea is found on p. 11: "purchase reusable cups for visitors" to eliminate unnecessary paper use.

These are not just another set of booklets on environmental technologies, but *actual working projects* with successful results. Some of the suggestions we all know, but the success stories provide an impetus to encourage more positive environmental savings, as well as money. [Susan Jarzen, Book Review Editor]

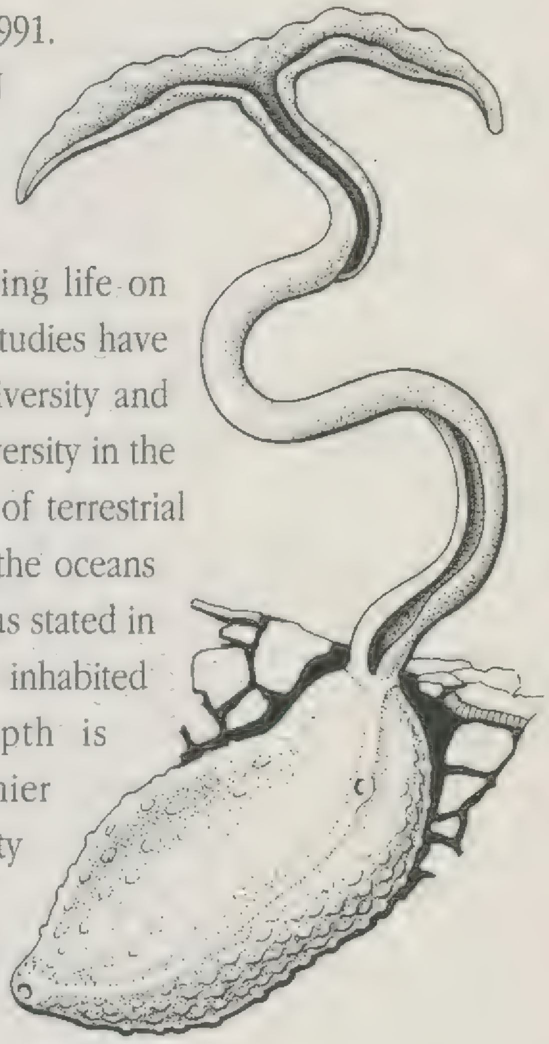
Filling the global pantry: Preserving our world's food supply

A Seminar sponsored by the Unitarian Service Committee of Canada in Saltspring Island, British Columbia, on 15-17 October 1993. Unitarian Service Committee of Canada, British Columbia Office. 25 pp.

This seminar was heralded by participants and organizers. Links were identified between the issues of food security and genetic diversity that are faced by Canadians and Ethiopians. Highlighted was the role the small farmer plays in preserving plant genetic diversity in both countries. The seminar gave participants a continuing mandate in realizing that "small numbers of people can bring about tremendous change." Solution-oriented opportunities for community education, networking with scientific and government sectors, and further analysis of agricultural policy issues were also discussed. For further information, contact the USC Canada National Office, 56 Sparks Street, Ottawa, Ontario K1P 5B1. A $5 seed package purchase will plant 1/2 acre of wheat in Ethiopia. [David Jarzen, Book Review Editor]

The living ocean: Understanding and protecting marine biodiversity

By Boyce Thorne-Miller and John Catena. 1991. Island Press, Washington, D.C. 180 pp. ISBN 1-55963-064-7.



Numerous studies have substantiated the key role of biological diversity in sustaining life on Earth. On the other hand, surprisingly few studies have focused on the importance of marine biodiversity and ascertained whether or not the biological diversity in the oceans is threatened to the extent of that of terrestrial habitats. This is surprising considering that the oceans cover 70 percent of the Earth's surface, and as stated in the book, contain on the order of 100 more inhabited space than the continents when depth is considered. *The Living Ocean* is a premier presenting an overview of biological diversity in the marine environments.

The Living Ocean comprises eight chapters. In the first chapter, "Is Marine Biological Diversity Threatened?" Thorne-Miller and Catena mention that habitat destruction, water pollution, marine debris, over-harvesting, and global climate change are all having a toll on the marine ecosystems and biodiversity. As they point out in their introduction, "...marine ecosystems are so vast, varied and unexplored...species may disappear within the sea without a ripple observed by the human eye." It is obviously difficult to assess how endangered marine species may be. The authors emphasize, however, that "the variety of human assaults from land and sea...has led to impoverishment or a weakened state for many marine ecosystems." Although the threat to marine species has not been fully recognized, the deterioration of coastal waters by pollution and coastal development is now acknowledged worldwide.

In Chapters 2 to 4, Thorne-Miller and Catena describe how science defines biological diversity (Chapter 2) and identify the major marine biomes for both the coastal and oceanic realms (Chapters 3 and 4), including the characteristics of the biological diversity and processes maintaining diversity. To stress the richness of the oceans, especially the seafloor (also called the "benthos"), the authors cite the results of a recent scientific study where samples equivalent to 21 square meters of the deep-sea benthos from the North Atlantic were analyzed. The samples contained 898 species, representing over 100 families and a dozen phyla. Of those 898 species, 460 were new to science (p. 61). Thorne-Miller and Catena mention that an extrapolation from this study suggests that "there may be millions of species—giving the deep sea an animal diversity of a magnitude approaching that of the tropical rain forests." Imagine then what the total biodiversity found in all marine ecosystems might be when one adds the biodiversity of the deep-sea benthos to that found in hydrothermal vents, in the plankton, in the rocky intertidal and subtidal shores, in estuaries and salt marshes, and especially to that found in coral reef areas from around the world, which are considered to be among the richest habitats on Earth! Clearly, the total biodiversity found in all of the oceans of our watery planet could be breathtaking, possibly in the many millions or tens of millions of living species. In the foreword Silvia Earle states, "if basic, broad categories—phyla, classes, and such—are given somewhat greater weight than the splintery ends of diversity recognized as species, then the greatest diversity of life is unquestionably in the sea." And imagine this: "Only one excursion has been made to the deepest part, which is seven miles down, for twenty minutes, thirty years ago.... The magnitude of ignorance about the ocean and the diverse life therein is vast...."

Chapters 5, 6, and 7 cover the topics of conservation, national programs, and laws as well as international conventions and programs. On the subject of conservation (Chapter 5), Thorne-Miller and Catena write, "...as it is recognized that the ocean is a vital living system that may hold the only hope for maintenance of the biosphere in the face of the escalating destruction of terrestrial ecosystems." The topic of "economic incentives" as well as the recent birth of a promising new field, "Ecological Economics," are briefly discussed among other subjects in the light of the relationship between economics and biological diversity and the promotion of conservation of natural resources.

In Chapter 6 the authors outline the effort by the United States to protect marine biological diversity, which, according to them, "has been sporadic at best." Those conservation efforts include the **National Marine Sanctuaries Program,** the **National Estuarine Research Reserve and National Wildlife Refuge** systems; they also include a number of laws aimed at preventing the overexploitation of species (e.g. the **Endangered Species Act** and the **Marine Mammals Protection Act**) and ensuring the water quality and habitat protection (e.g. **Clean Water Act, Ocean Dumping Act**).

In Chapter 7, several international conventions and programs aimed at protecting the marine environment are also reviewed (e.g. the **International Whaling Commission, the Antarctic Treaty Programs**).

Finally, in Chapter 8, Thorne-Miller and Catena deal with conserving marine biodiversity in the future. They begin this chapter by stating, "The problems created by multiple uses of a fluid environment that cannot be compartmentalized and does not honour political boundaries are complex." The need for further research (eg. systematics, taxonomy, genetic research, and oceanography) and sustainable development of marine resources are among the topics discussed in this chapter. The authors also point out the importance of assigning economic values to marine biological diversity, including "direct values" (consumptive and productive uses) and "indirect values" (nonconsumptive uses, ecological functions, future options, mere existence). Thorne-Miller and Catena state that "insofar as economics seems to be the most powerful force driving human societies to modify, rearrange, or destroy ecosystems in their quest for space and natural resources, this new way of assigning value to biological diversity is to be encouraged."

The Living Ocean: Understanding and Protecting Marine Biodiversity is easy to read, extremely informative, and *should be read* by all policy-makers and managers as well as by environmentalists and the general public who are interested in the oceans, and above all, concerned about the global loss of biological diversity on the planet.

André Martel, Research Scientist, Canadian Museum of Nature

Economics for the wilds, wildlife, wildlands, diversity and development.

Edited by T.M. Swanson and E.B. Barbier, 1992, Earthscan Publications Limited, London, England, 226 p., ISBN 1-85383-124-1.

Economics for the Wilds is an excellent book by British authors on current economic thought concerning wildlife, habitat, and biodiversity within the context of international development. This work is written very clearly with little of the technical economic jargon. Where technical terms are used, they are most often defined.

The book comprises a series of chapters written by several different authors, mostly academics, frequently with the editors as co-authors.

Starting with an introduction that presents the context and extent of topics covered, the editors progress to several chapters on applicable economic thoughts and methods concerning biological resources. Other chapters offer concrete and interesting examples of wildlife and forestry management, administration, and research studies. The text ends with a short concluding chapter. Much of the writing is concerned with the conservation of biodiversity and the economic challenges and anomalies this creates. Many of the international policies and programs (international funding mechanisms) such as the World Heritage Fund and Global Environmental Facility, the Convention on International Trade in Endangered Species (CITES), and the 1992 Convention on Biological Diversity are described and analyzed. Practical implications of these (and other) mechanisms to biodiversity conservation are examined and discussed.

One paragraph in the concluding chapter embodies many of the elements discussed in the book:

> ***"Currently, only about 4 percent of wildlands have any 'protected' status, and even these will be in jeopardy as buffer stocks erode. Although it might be possible to provide for more preservation areas in these developing countries, it is not really fair to ask for them. These are 'special' resources to the developed world, largely because of the small amounts of natural habitat remaining in the North. To the local communities, however, these resources are their lands—their lifestyles, opportunities, and hopes for the future are tied in with these places that we, as Northerners, wish to 'preserve,' sometimes as museum pieces."***
>
> (page 215)

The essential thesis of the work is that appropriate "wildlife utilization affords the possibility of making development consistent with diversity. At the heart of a new conservation policy is enabling local communities to make use of the diversity that exists all around them" (page 216). If local peoples cannot make use of the diversity of biological resources, the resources become worthless and potentially negative in value. Clearly, this is not a good strategy if the true value of this diversity is to be recognized.

Economics for the Wilds provides an excellent discussion and rationale for the conservation of biodiversity in economic terms readily understandable by all professionals in the field. It is highly recommended reading for both economists and non-economists.

Peter G. Whiting, P.G. Whiting and Associates, Economic and Resource Consultants, Ottawa, Ontario K2A 2R6

Wetlands in danger: A world conservation atlas

Edited by Patrick Dugan with introduction by David J. Bellamy. 1993. Oxford University Press, New York, 192 pp., Cloth, ISBN 0-19-520942-7, CAN$47.00.

Wetlands have, in the past, been viewed by humans as the enemy, an unusable nuisance to be cleared, filled in, drained, or otherwise altered. Slowly this attitude is changing as we begin to learn about the benefits of wetlands to society and wildlife.

Over the past few years wetlands have become a worldwide concern for the conservation of water supplies, drainage and flood control programs, and as a source of biological diversity. This book, edited by Patrick Dugan, provides in an atlas format the current status of wetlands, their importance to human survival, and their complex biodiversity and genetic resources.

Major geographic areas of the world from northern Arctic regions to tropical areas and oceanic islands are discussed in nineteen chapters. Each area includes data, photographs, and maps on protected areas, conservation policies, and brief discussions on specific wetland or watershed projects or developments.

Supplementing this magnificently illustrated "coffee table" type book are short chapters on defining wetlands, the need for and reasons to preserve wetlands, and the nature of life in wetlands (plant and animal adaptations). The final chapter is dedicated to the current challenge of conservation, including international cooperation. A general and species index complete the book, allowing the reader to search for specific areas or species of interest. The book is quite readable and an excellent starting point for an understanding of global wetlands. I have added this book to my personal library. [David M. Jarzen, Book Review Editor]

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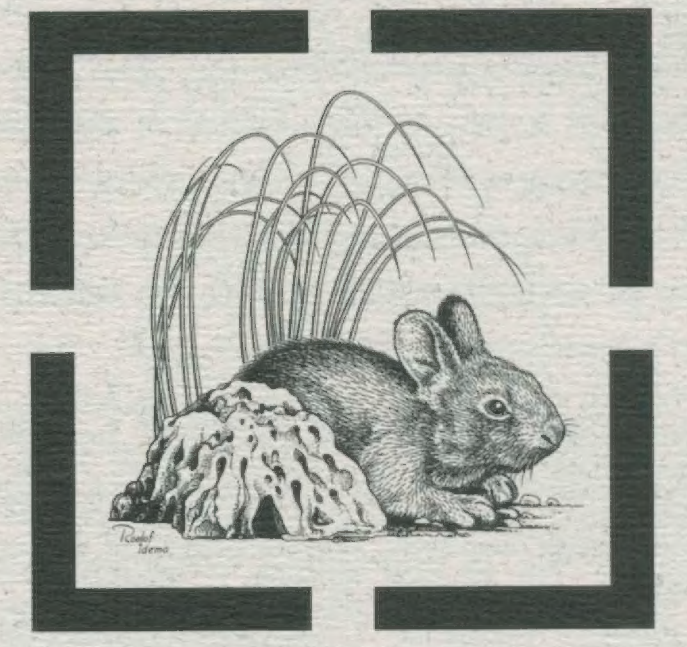

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Upcoming in Volume 5

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Do YOU have something to contribute? What are the specific areas under this subject you would like to see covered? Are you involved in a relevant policy committee, research project, conservation initiative, or industry?

If so, please contact: ***Don E. McAllister, Editor***

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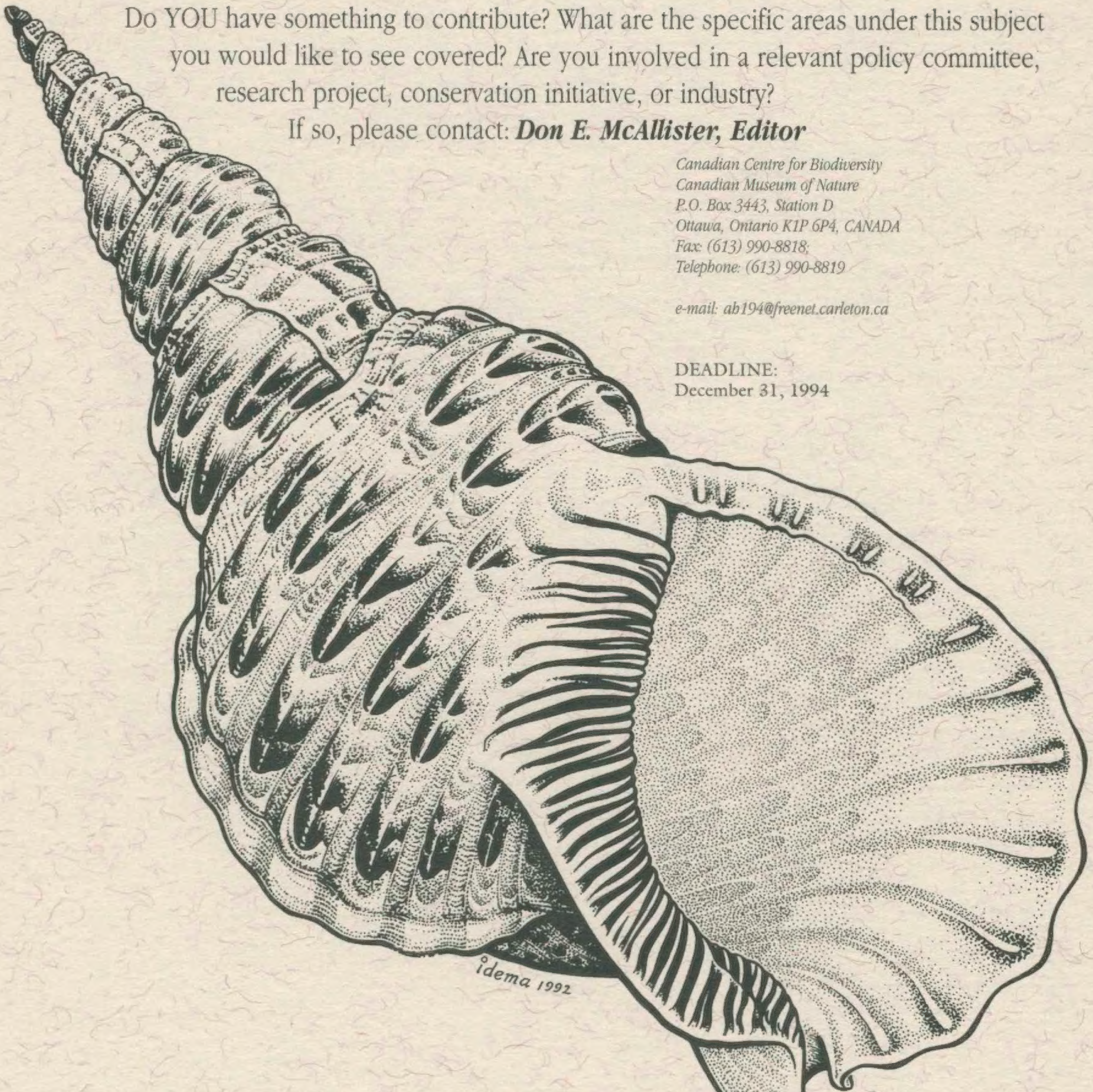

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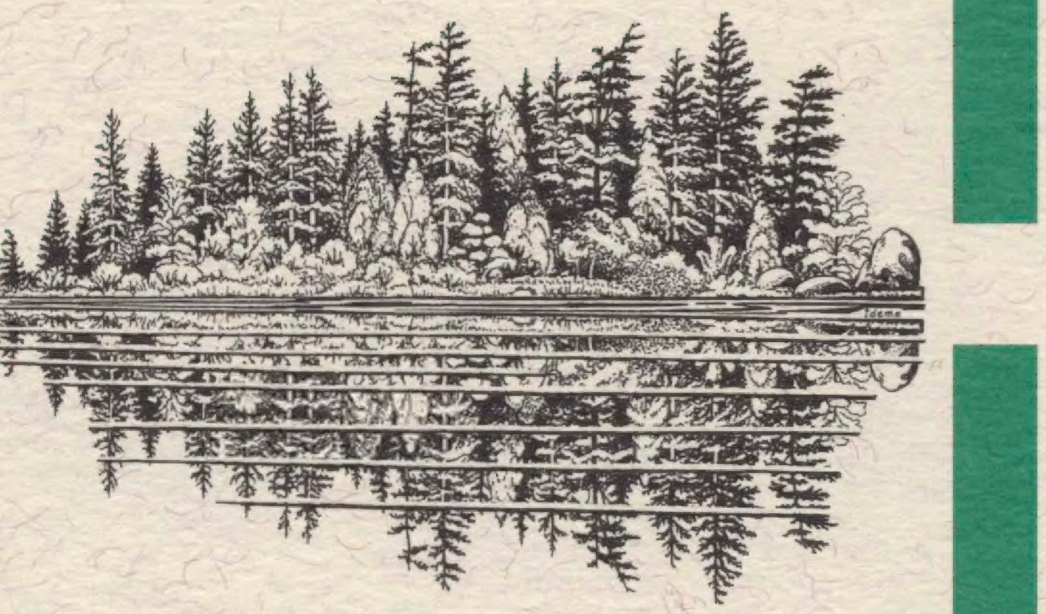

If the land mechanism as a whole is good, then every part is good, whether we understand it or not.
If the biota, in the course of aeons, has built something we like but do not understand,
then who but a fool would discard seemingly useless parts? To keep every cog and wheel
is the first precaution of intelligent tinkering.

Aldo Leopold, 1949, ***A Sand County Almanac***

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